I. C. 7338

November 1945

UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

[illegible]

INFORMATION CIRCULAR

GEOPHYSICAL ABSTRACTS 121

APRIL - JUNE 1945

BY

W. AYVAZOGLOU AND V. SKITSKY

I.C. 7338,
November 1945.

INFORMATION CIRCULAR

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 121
April - June 1945[1]

Compiled by W. Ayvazoglou and V. Skitsky[2]

CONTENTS

Page
1. Gravitational methods.. 1
2. Magnetic methods.. 7
3. Seismic methods... 12
4. Electrical methods.. 22
5. Radioactive methods... 25
6. Geothermal methods.. 28
7. Geochemical methods... 29
8. Unclassified methods and topics related to geophysics............... 30
9. New publications.. 35
10. Patents.. 36
Index.. 45

FOREWORD

Geophysical Abstracts 1 - 86 were issued in mimeographed form by the Bureau of Mines; Abstracts 87 - 111 were published in bulletins of the Geological Survey; Abstracts 112 - 120 were issued in mimeographed form by the Bureau of Mines as Information Circulars 7256, 7257, 7267, 7273, 7285, 7292, 7303, 7310, and 7324.

1. GRAVITATIONAL METHODS

7933. Ansel, E. A Eine Untersuchung zum Problem der Isostasie (An Investigation Regarding the Problem of Isostasy). Gerlands Beitr. Geophys., Leipzig, vol. 59, 1942, pp. 16-26.

---

[1] The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7338."

[2] Physical science analytical editor, Bureau of Mines, U. S. Department of the Interior.

Certain deductions are drawn from the isostatic theory regarding the continents and the surfaces covered with water. They are based on simplifying assumptions which serve for calculating the thickness of the earth's crust, pressures under the ocean pole and the continental pole, change of pressure at the boundary between ocean and continent, etc. The computations are indicated and the values given. It is discovered that the pressure existing on the isostatic level under the surfaces covered with water does not equal that under the continents. Moreover, at the lower limit of the earth's crust, the pressure under continents increases gradually from the pole to the ocean, undergoes an abrupt change at this boundary, and then increases gradually again under the ocean-covered ground until the ocean pole. - V. S.

7934. Ballarin, Silvio. Errori medi di diciotto determinazioni di gravità relativa eseguite in Sicilia nel 1929, e notizie sull'andamento della campagna (The Average Errors of 18 Measurements of Relative Gravity Made In Sicily in 1929, and Remarks Regarding the Field Survey). Boll. Geodet., vol. 2, 1942, pp. 151-155

In 1929 the Instituto Geografico Militare, Italy, organized a survey of relative gravity in Sicily. The instruments consisted of the double-pendulum apparatus of Mioni, the thermometer of Woytacek, the barometer of Solmoiraghi, the psychrometer of Assmann, and the chronometer of Nardin. Chronometric readings were checked against international rhythmic signals from Bordeau and Rugby. For observation, two procedures were used: (a) All the pendulums were made to oscillate simultaneously four times, and measurements were taken of the time intervals separating 60 successive coincidences; and (b) observations also were conducted at equal intervals as measured on the chronometer. In the calculations, the constant σ of the pendulum's staff was computed for each station by the method of Borrass. The results were tested for different elements of error, accidental and systematic, referred to one oscillation or to a series, and to one station or to different stations. The values obtained are given. The main part of the accidental error is found to be due to an incorrect position of the pendulums caused by imperfections of the supporting surfaces. The average value of the error in the determination of the difference of gravity between the basic station and any field station is ± 0.0035 gal. - V. S.

7935. Dubiago, A. D. Remarks on Estimating the Precision of Observations Made with Variometers (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Sér. Géogr. Géophys., Moscow, vol. 8, No. 1, 1944, pp. 18-24.

Measurements made with gravitational variometers give values of the second derivatives of the potential of gravity. Such gradients serve, with due corrections, for preparing isogam maps. The author examines the precision of variometer observations with a view to determining the accuracy of the maps. The average errors of gravity gradients traceable solely to the performances of the observer and of the instrument are approached in the light of the total average quadratic errors of gradients produced by all the causes of error involved. The latter errors are expressed mathematically in terms of the discrepancies discovered between anomaly values at the closure of separate polygons in a variometer survey; both the completely and incompletely closed polygons are considered. On the basis of these discrepancies, new formulas are obtained for the accuracy of variometer observations; their mathematical derivation is presented. In a companion study the author has calculated the accuracy of integration of gravity gradients. - V. S.

7936. Eby, J. B. Geophysical History of South Houston Salt Dome and Oil Field, Harris County, Tex. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 2, 1945, pp. 210-214.

The South Houston salt dome was discovered by the Stanolind Oil & Gas Co., by use of the torsion balance, in May and June, 1934. The structure was confirmed a few weeks later by reflection seismograph, by the Independent Exploration Co., under contract to the Stanolind. The original gravity anomaly was partly obscured by the influence of a large regional gravity-minimum area, commonly referred to as the "Pearland regional minimum." The discovery of the South Houston salt dome is unique in respect to the accuracy with which the domal uplift was localized and the very limited amount of work necessary to find it. Subsequent drilling confirmed the salt dome, and oil was discovered in commercial quantities immediately thereafter. - Author's abs.

7937. Erola, V. On the Structure of the Earth's Crust in the Neighbourhood of the Ferghana Basin. Ann. Acad. Sci. Fennicae, Helsingfors, A 3, vol. 3, 1941, pp. 1-77.

An isostatic study was made of the Ferghana Basin, Central Asia. From the 185 initial gravity measurements, 162 reliable values were selected for the basin proper and its neighbourhood. Anomalies were calculated according to the international formula for gravity. The reductions were made for the free-air anomalies, Bouguer anomalies, isostatic anomalies (after Pratt-Hayford and Airy-Heiskanen), and regional isostatic anomalies (after Vening-Meinesz). The methods and reliabilities of the computations are clarified by examples. The results are presented together with gravity profiles and maps. The distribution of the gravity values shows a marked minimum in the Ferghana basin. The center of this minimum has values ranging, according to the kind of reduction applied, from - 100 to - 250 mlg. The minimum can be explained by the assumption that the earth's crust is thicker here by several kilometers than is necessitated by isostasy. - V. S.

7938. Haalck, H. Ergebnisse der vollständigen Berechnung des gravimetrischen Störungsfeldes im Gebiet von Gifhorn (Results of a Complete Calculation of the Gravity Anomaly in the Region of Gifhorn). Beitr. angew. Geophys., Leipzig, vol. 9, 1942, pp. 290-302

The author advances a new method for the calculation of gravity disturbances. This method serves to compute, from torsion-balance gradients and curvature values, the vertical gravity-gradient W and leads to a complete determination of a disturbance field. An application was made in the case of the gravity anomaly at Gifhorn. The initial observations are indicated. There are also given gradients and curvature values, isanomalies of the intensity of gravity and of the vertical gradient, vectors of the vertical anomaly, and lines of equal deviation of the niveau-surface from a level. As a result of calculations, the total gradient is found to be about 90 Eötvös units; the maximal effect of the salt mass, about 80 Eötvös; that of deeper masses, about 40 Eötvös. Thus, the salt dome is clearly delineated. - V. S.

7939. Hammer, Sigmund. Estimating Ore Masses in Gravity Prospecting. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 50-62.

The interpretation of the results of gravitational prospecting surveys is considered, from a theoretical point of view, in terms of the magnitude of the causative mass as distinct from the conventional interpretation in terms of the mass distribution (size, shape and depth). A general proof is given, based on Gauss' theorem in potential theory, that the former problem is unique, and the uniqueness is illustrated by an analytical example which also serves to demonstrate the well-known lack of uniqueness of the latter problem.

Practical formulae are presented for estimating the total mass directly from the gravity data and the precision of the mass estimate is considered. The method is applied to a practical gravimeter survey over a known chromite ore body and the estimated mass is found to be in excellent agreement with estimates from core drilling. - Author's abs.

7940. Hammer, Sigmund, Nettleton, L. L., and Hastings, W. K. Gravimeter Prospecting For Chromite in Cuba. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 34-49.

As a contribution to the War Production Board's program of exploration for strategic minerals and under an arrangement with the Bethlehem Steel Co., Gulf Research & Development Co., in early 1942, made gravimeter surveys in the chromite-bearing Camaguey district, Cuba. One large chromite deposit, under and between two adjacent gravity anomalies, which has been outlined to date by core drilling based on the results of this work, constitutes a substantial addition to the chrome ore reserves of the district.

Chrome ore bodies occur in or are associated with igneous rocks. Extensive density determinations of selected rock samples revealed that the chrome ore has a positive density contrast of about 1.5 with respect to the serpentine rock in which it occurs but also that local occurrences of various other types of igneous rocks, as well as weathered surface material, cause appreciable density contrasts.

The technical aspects of the gravimeter field work are discussed. Many gravity anomalies were found; subsequent geological field work and a systematic program of test drilling proves the anomalies to arise from a variety of causes. Typical examples of gravity anomalies due to chromite deposits and to various igneous rock masses are presented. The paper concludes with brief comments on the economic significance of the work. - Authors' abs.

7941. Kovrigina, V. I., and Bulanzhe, Iu. D. A New Determination of Thermal Coefficients of the Pendulums of Apparatus No. 136608 belonging to the Cambridge Society (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 96-99.

Invar pendulums have variable thermal coefficients. Measurements had been made of these coefficients in 1936-37 for the three pendulums of Apparatus 136608 belonging to the Cambridge Society. They showed marked systematic variations. In the winter of 1937-38 new determinations of thermal coefficients were undertaken for the same apparatus. This investigation was carried out in the thermal chamber of the Gravimetric Laboratory of the Seismological Institute in Moscow. The method and the results are described. Systematic errors again were detected in the measurements. The conclusion is drawn that invar pendulums require basic determinations of thermal coefficients not less than once per year. - V. S.

7942. McGuckin, G. M. History of the Geophysical Exploration of the Cameron Meadows Dome, Cameron Parish, La. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 1-16.

In order to demonstrate the growth of our knowledge of a typical Gulf Coast salt dome concurrently with development of the science of geophysics, the successive application of various techniques to the exploration of the Cameron Meadows dome is described and illustrated. These methods were: mechanical refraction seismograph (1926); torsion balance (1927); electrical refraction seismograph (1928-29); early correlation reflection seismograph (1929); dip reflection seismograph (1933); special salt profiling refraction seismograph (1942); continuous correlation reflection seismograph (1942); gravity meter (1943). - Author's abs.

7943. Solaini, L. Determinazioni di gravita lungo la linea di livellazione di alta precisione Genova - Isola del Cantone (Gravity Determinations Along the Line of a Highly Precise Topographic Survey Between Genoa and Isola del Cantone). Riv. Geomineraria, vol. 3, Nos. 3/4, 1942, p. 16.

A topographic survey of great precision was carried out between Genoa and Isola del Cantone, Italy. As a part of this survey, the Military Geographic Institute has made, through Lerici's Center of Geomineral Prospecting, a number of gravimetric measurements between these points. The Ising gravimeter was used; the average error for a station amounted ± 0.18 mgl. The instrument was calibrated by means of comparisons with the data obtained in the same locations by a gravimeter of a different construction and by a pendulum. - V. S.

7944. Tamura, M. On the Newly Designed Driving Mechanism of Free Pendulum. Jour. Meteorol. Soc. Jap., Tokyo, vol. 17, 1939, pp. 325-331.

In this mechanism the gear and escapement movement is avoided. At every swing of the pendulum, it receives impulse by a falling weight which has been raised by means of an electromagnet. That is, in the same direction of the pendulum, the top of suspension chop is carried a short distance (2 or 3 microns), immediately before the pendulum has crossed the line of center. The pendulum is entirely free, and the principal part of the mechanism is free from friction; therefore it does not need any supply of oil. The pendulum is suspended in an airtight case placed in a room maintained at constant temperature, so that it is subjected to low air pressure. Therefore the period of the pendulum is rendered free from the effect of the disturbing influences due to fluctuation of air pressure, temperature, escapement friction, motive force, etc. - Author's abs.

7945. Tovchigrechko, S. S. The Calculation of the Isostatic Reduction of Gravity for Gravimetric Stations in the Crimea and the Black Sea (in Russian). Tsentral'nyi Nauchno-Issledovatel'skii Institut Geodezii, Aeros'emki i Kartografii GUGK pri SNK SSSR, Sbornik 7, Issledovaniia po Gravimetrii, Moscow, 1941, pp. 81-86.

A tentative calculation is presented of isostatic reductions of gravity for the gravimetric stations in the Crimea and the Black Sea. The tables of O. Meissner, Tabellen zur isostatischen Reduktion der Schwerkraft, based on Pratt's hypothesis were used (see Astronomische Nachrichten, vol. 206, 1918). In all, 15 stations in the Crimea and 4 stations in the Black Sea were covered. The source material, methods of computation, and underlying formulas are indicated; a tabulation of data on the Bouguer, isostatic and free-air anomalies is given. Some maps are included. The tentative conclusion is advanced that there is no isostatic compensation in the Crimean region. - V. S.

7946. Vening-Meinesz, F. A. The Earth's Crust under the Ocean (in Dutch). T. Nederl. Aardrijks. Genootsch. Amsterdam, ser. 2, vol. 58, 1941, pp. 1033-1038.

The material collected during gravity observations at sea has been subjected to recalculation. This was done by the use of new tables for local and regional isostatic reductions computed on the basis of Airy's system. The recalculations are discussed. Certain results are communicated on the gravity anomalies in the earth's crust under the ocean. The abrupt change in anomalies found at the boundary of continents by former reductions is not indicated by the new computations. Instead, the transition to the weak positive anomalies of different ocean basins is gradual. It seems, moreover, that the earth's crust generally thins out toward the ocean at the boundary of a continent by about 16 to 20 km. Such a thickness corresponds to that of the granitic layer, as determined by seismic measurements. It may be concluded, therefore, that the granitic layer underlies only the continents but not the ocean. Such a hypothesis would give a simple explanation of the equal average depths of different oceans. The hypothesis is discussed in its different aspects. Other results are given. - V. S.

7947. Woollard, G. P. Gravity Observations in Northern New England. Trans. Nat. Research Council, Am. Geophys. Union, 1944, pt. II, Washington, D.C., 1944, pp. 254-258.

The writer made a gravity survey in northern New England in 1943. The measurements were carried out with a Humble Oil Co. "X"-type gravity meter. 51 new stations were established at about 6-mile intervals in the region between Burlington and Rutland, Vt., Nashua and Gorham, N.H., and Freeport, Me. The Bouguer anomoly values were plotted on a map. This map revealed two features continuous from southern to northern New England. One is the area characterized by very low gravity values and stretching along the Hudson Valley and Lake Champlain. The other is the parallel area of higher gravity values just east of the New York State line. A study of these areas in conjunction with the corresponding elevation profiles shows unique gravity relations. The gravity low along the Hudson Valley apparently indicates a subcrustal "root" of a material of lower density; this low is not confined to any type of surface lithology. On the other hand, the gravity high along the Green Mountains has no "root" beneath these mountains but high-density rocks totally uncompensated. Such relations seem to indicate that the real causes of the anomalies should be sought in the sub-crustal mass distribution; apparently the gravity high lies along the axis of the Green Mountains by mere coincidence. The author takes the view that the areas of positive and negative anomalies are areas where the earth's crust thins and thickens. - V. S.

2. MAGNETIC METHODS

7948. Allen, C. W. Relation between Magnetic Storms and Solar Activity. Mon. Not. R. Astr. Soc., London, vol. 104, No. 1, 1944, pp. 13-21.

The effects of solar flares and of sunspots on terrestrial magnetic storms have been studied statistically. The magnetic data covered the period 1906-42; disturbed days were divided into four classes on the basis of recurrence. The solar data comprised days on which large spot groups crossed the central meridian, and days on which flares and radio fade-outs were observed. Correlations were sought between magnetic disturbances and spot groups, and between the disturbances and the flares. The results are described by classes. If all four classes are grouped together, a featureless curve is obtained, which shows why no general relation between sunspots and minor recurrent storms has been noticed before. - V. S.

7949. Bodle, R. R., and Steenland, N. C. Report on Magnetic Survey and Seismological Observations Made in the Vicinity of Paricutín Volcano, State of Michoacan, Mexico, May - July, 1943. U. S. Coast and Geodetic Survey, Washington, D. C., Special Report Issued for Limited Distribution, 1944, 33 pp.

The recent formation of the new volcano Paricutín in Mexico has offered a rare opportunity for magnetic and seismological studies. (1) A magnetic survey was made by the authors in the summer of 1943 to investigate the effects of volcano formation on the earth's magnetic field. The instruments included magnetometers for base stations and an Askania (Schmidt) vertical intensity magnetic balance for field traverses. The data are tabulated and discussed; relative magnitudes of the vertical intensity are referred to an aerial mosaic map. The results show that the volcano has exerted no significant influence on the earth's magnetic field. However, the available evidence is not sufficient for final conclusions. (2) Preliminary seismological observations were also made for determining the underground sources of the volcano. The equipment was set up at Uruapan, 16 miles from the volcano. It consisted of two Coast and Geodetic Survey vibration meters; short period pendulums of 1 second were used. The observations showed that the ordinary volcanic explosions were not transmitted to Uruapan. It was concluded that the explosions of the volcano were shallow. - V. S.

7950. Evrard, Pierre. Quelques remarques au sujet de la courbe d'anomalie magnétique verticale due à une couche mince inclinée (Some Remarks on the Subject of the Curve of a Vertical Magnetic Anomaly Produced by a Thin, Inclined Layer). Bull. Soc. Roy. Sci. Liège, vol. 11, 1942, pp. 105-119.

The depth and inclination of a thin magnetic layer in the subsurface are calculated on the basis of several preliminary mathematical discussions. (1) A determination is made of the vertical component of a magnetic anomaly produced by a thin magnetized plate. (2) The problems of a perpendicular and an inclined magnetic layer are calculated, with a plotting of the curve of Z-disturbances. (3) Finally, the incidental question of the zero level is discussed, and a geometrical solution is offered. - V. S.

7951. Fanselau, G. Methodische Bemerkungen zu den magnetischen Deklinationsmessungen (Methodological Remarks on Measurements of Magnetic Declination). Gerlands Beitr. Geophys., Leipzig, vol. 59, 1942, pp. 27-31.

A new method is given in which the adjustment of the suspension thread to the torsionless position is avoided. According to the method, a complete determination of declination (with two magnets) may be made by two different adjustments of the torsion head, which are to be chosen almost symmetrically with regard to the corresponding torsionless position, for example, by turning the torsion head about + 40° and - 40° from the original position. The calculation of the torsion correction is explained in detail and demonstrated by example. It is also shown how the relative measurements may be made by using only one magnet and one torsional adjustment, if the ratio γ = D/MH between the torsional constant of the tread and the torsion moment of the horizontal field is determined for itself. - V. Laursen, Zentralblatt Geophys., Meteorol. und Geodäs., vol. 10, No. 5, 1943, p. 242; translated by W. A.

7952. Hirayama, M. Some Problems on the Earth-Magnetic and Electric Fields (in Japanese, with an English summary). Jour. Meteorol. Soc. Jap., Tokyo, vol. 17, 1939, pp.43, 435-441.

This is an attempt to explain the observed results of the two components of earth-current and the time variation of the vertical magnetic force obtained by rapid registrations at the Toyohara and Kakioka Magnetic Observatories. By using - dB/dt = rot E (B = magnetic induction, E = electric force) and assuming that the vertical electric current at the earth's surface vanishes, the author has arrived at the conclusions that the pulsatory oscillations recorded at the two observatories are explained to be caused by standing waves, since there are no phase differences between the two components of earth-current and the time variation of the vertical magnetic force. But when there are phase differences between them the records can not be explained to be caused by progressive waves. - Y. Kodaira, Zentralbl. Geophys. Meteorol. Geodäs., vol. 6, 1940-41, p. 186.

7953. Johnston, H. F. American Magnetic Character-Figure, C, Three-Hour-Range Indices, K, and Mean K-Indices, K_A, for July to December, 1944, and Summary for 1944; also Five International Quiet and Disturbed Days for April to June, 1944. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 4, 1944, pp. 261-264, and vol. 50, No. 1, 1945, pp. 47-55.

Tables are given with explanatory test. - V. S.

7954. Jones, R. H. B. Geologic Interpretation of Magnetic Exploration on the Mesabi Range, Minnesota (abs.). Econ. Geo., Lancaster, Pa., vol. 40, No. 1, 1945, p. 88; also Skillings' Min. Rev., Duluth, Minn., vol. 33, No. 40, 1945, p. 2.

The Pewabic formation of the Mesabi iron range, Minnesota, has been explored magnetically. The results of a number of surveys are described, and the magnetic anomalies obtained are correlated with phases of ore development within the iron formation, as determined by exploration. It is found that magnetic intensities depend chiefly upon the magnetite content of particular horizon This content in turn depends upon the degree of oxidation, the nature of the overlying and underlying horizons, and the extent of the fracturing, folding, or faulting. - V. S.

7955. Kalashnikov, A. G. Regarding the Possible Causes of Magnetic Anomalies in the Region of Moscow (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Ser. Geogr. Geophys., Moscow, No. 2, 1943, pp. 83-85.

The causes of magnetic anomalies in the region of Moscow have been explored. (1) Two field axes were drawn through the Boensk borehole in Moscow's outskirts, one along the trend of the anomalies and another perpendicular to it. Then the vertical component of the earth's magnetic field was measured along both these axes, and profiles were plotted. On the other hand, the magnetic susceptibility of rock samples was determined through the depth of the Boensk borehole, and a downward profile was drawn. The profiles are given. (2) The results for the vertical magnetic component showed very wide fluctuations. The range of values on the second field axis attained 1,600 gammas; the maximal positive anomaly, located near the borehole, measured 1,000 gammas. (3) The results for the magnetic susceptibility of rock samples showed magnetically indifferent sedimentary rocks down to a depth of 1,600 meters. But below 1,6500 m. there was found a heterogeneous, strongly magnetic crystalline basement having an average susceptibility between 500 and 3,500 x 10^{-6}. (4) A calculation of the surface effect of the latter magnetic susceptibility gave the same value as had been actually measured near the borehole; the computations are given. It is concluded that the Moscow magnetic anomaly can be explained by its proximity to a crystalline basement possessing high magnetic susceptibility. - V. S.

7956. Observatory. The Great Magnetic Storm of 1941, March 1. London, vol. 64, 1941, pp. 82-86.

The magnetic storm of March 1, 1941, is described according to the records of Abinger Observatory. The total amplitudes were: 3°01' in D, 1710 γ in H, and 850 γ in Z. As regards causes, the storm is traced to the strong chromospheric eruption of February 28 and to the large sun spot that passed the central meridian on February 27, as observed at Greenwich. The storm of 1941 and the great storm of September 25, 1909, are compared. - V. S.

7957. Rössinger, M. Die Entstörung magnetischer Beobachtungsräume und erdmagnetischer Observatorien von Gleichstrom-Magnetfeldern der elektrischen Bahnen (Disturbances Produced in Spheres of Magnetic Observations and in Observatories of Terrestrial Magnetism by the D.C. Magnetic Fields of Electrical Railroads). Naturwiss., Berlin, vol. 30, 1942, pp. 753-755.

Cosmic variations and man-made electric arrangements, such as electric railroads, affect the geomagnetic field and influence magnetic observations. A method is described for compensating for these effects and rectifying the observations. It operates within a limited area and counteracts the combined disturbances existing in any components of the terrestrial field. The apparatus is a special variometer switched into the local electric light installation. It uses the electric currents accompanying magnetic disturbances and proportional to them for generating magnetic fields equaling and opposing the disturbance fields and canceling their effects. This method was applied to eliminate the effects of electric railroads at the Potsdam Magnetic Observatory, which suffers much from interference. The procedure and instruments employed are described. The observatory's area was successfully freed from disturbance. - V. S.

7958. Skillings' Mining Review. Magnetic Surveys for Iron Ore in New Jersey. Duluth, Minn., vol. 33, No. 19, 1944, p. 8

During the year considerable magnetic surveying has been done in the northern New Jersey iron-ore belt. It resulted in several important disclosures of low-grade magnetic iron ore. Deposits of considerable size have been found at the old Pequest mine east of Belvidere and at other locations near Great Meadows and Mount Bethel, all in Warren County. In these areas a campaign of diamond drilling will be needed to outline accurately and determine the grade of the iron ore. - Anonymous

7959. Taylor, J. H. On the Determination of Magnetic Vertical Intensity, Z, by Means of Surface Integrals. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 49, No. 4, 1944, pp. 223-237.

The main result of the present paper is a separation of Z, the normal component of a magnetic field, into parts Z_e and Z_i due to external and internal sources, respectively. The resolution is given in terms of surface integrals whose integrands involve the observed surface values X and Z of the field, The paper may well be regarded as a sequel to an article by E. H. Vestine, On the Analysis of Surface Magnetic Fields by Integrals, Part I. - Author's abs.

7960. Vestine, E. H., and Davids, N. Analysis and Interpretation of Geomagnetic Anomalies. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 50, No. 1, 1945, pp. 1-36.

The analysis and interpretation of geomagnetic anomalies is discussed. Techniques are described for estimating depth and strength of magnetized orebodies, using tables and graphs of the fields of simple models. Relations among surface-components of field of anomalies are derived, using fitting or representation of anomalies by Fourier series, Fourier-Bessel series, and power series. A method based on the analysis of surface magnetic fields by integrals is also described. Methods are given for estimating probable minimum and maximum depths to magnetic sources beneath the earth's surface, using measurements of field at the surface. The locations of sources cannot be uniquely inferred from magnetic data alone. The use of gradients of field in locating sources of anomaly is indicated. - Authors' abs.

7961. Wasserfall, K. F. Harmonic Analysis of the Annual Variation of Magnetic Declination and Horizontal Intensity at Oslo, 1843-1930. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 50, No. 1, 1945, pp. 37-46.

In view of the importance of annual variations for the reduction of the series in magnetic horizontal intensity H and declination D (see Geophys. Abs. 106, No. 6152), harmonic analyses were made for these variations. The data covered the years 1843-1930. The analyses were based on the direct method using Fourier series. The calculated harmonic constants for D and H are presented; some results are embodied in graphs. The findings show that the figures for H are not as favorable as those for D. It is pointed out that harmonic analysis sometimes leads to exaggerated displacement of the phase angle. - V. S.

3. SEISMIC METHODS

7962. Andreotti, G. Ricerche sulla precisione conseguibile nelle determinazioni delle profondità ipocentrali per terremoti di origine vicina (Investigations Regarding the Accuracy Attainable in the Determination of Focus Depth of Nearby Earthquakes). Atti Mem..Addad. Sci. Padova, n. s., vol. 57, 1942, pp. 1-17.

Two determinations were made of focus depth for the earthquake of January 3, 1940, Fonzaso, Italy: (a) By the use of microseismic records from Padua and Triest, and of P-wave commencements; and (b) by means of the formula of B. Gutenberg and the time-difference between the arrivals of P-waves and of surface shear-waves, as registered at Padua and Treviso. Both methods gave the same focal depth of about 12.5 km. There was also calculated the accuracy of focal depth as attainable by the first method. Corrections were introduced for arrival times of individual P-waves, for focal distance, and for the velocity of wave propagation. It was found for the Fonzaso earthquake that an error of ± 0.1 sec. in commencement records, and an error of ± 2 km. in focal distances, produced an error of ± 28.8 km. in focal depth. Furthermore, an error of ± 0.1 sec. in travel time produced in this case an error of ± 15.4 km. in focal depth. - V. S.

7963. Båth, Markus. Sur une méthode pour calculer les tremblements de terre a foyer profond a l'aide des phases d'une seule station séismographique (On a Method for Calculating Earthquakes with Deep Foci by Means of the Phases at a Single Seismographic Station). Kungl. Svenska Vetenskapsakademiens Handlingar, Stockholm, Ser. 3, vol. 20, No. 4, 1943, 22 pp.

In the case of earthquakes with a deep focus, both the distance of epicenter and the depth of focus are unknown. Generally, the method of Gutenberg and Richter is used for their determination; other methods are variations thereof. The author offers a new method more complicated in calculation but more generally applicable; it requires the data of a single station. The principle of this method is described. Surfaces showing the functional dependence of propagation-times on distance and depth are calculated for each one of the phases of a seismogram. The surfaces of different phases are then combined in a three-dimensional space, with coordinates plotted for time, distance, and depth. Next, a plane is drawn for each surface, through its point on the time axis and penpendicularly to this axis. This plane will cut the surface along a curve representing the values of distance and depth corresponding to propagation time. The total procedure will give a system of time curves in a plane of distance-depth. With correct determinations of propagation-times and seismogram-phases, all the curves should intersect at one point, the focus. If errors are made in these determinations, producing a dispersion of intersections, the method of least squares can be used. The author deduces the necessary equations, demonstrates their mathematical application, gives a diagram of the differences between propagation times, and presents six concrete examples of calculation. - V. S.

7964. Bodle, R. R. Progress Report on Seismological Activities of the United States Coast and Geodetic Survey. Trans. Nat. Research Council, Am. Geophys. Union, 1944, pt. II, Washington, D. C., 1944, pp. 269-271.

The seismological activities of the U.S. Coast and Geodetic Survey continued during the period April 1943 to March 1944 with little interference from the war. They included teleseismic work, earthquake information service, strong-motion work, instrument work, and miscellaneous activities. (1) Teleseismic data were published for 23 stations, as heretofore. A few details are given on some stations. (2) Field data were collected from various collaborating stations and consultants. No outstanding earthquakes were observed. (3) Strong-motion work continued at 53 stations of the Survey and at cooperating agencies. The program of reducing accelerograph sensitivity was extended to a few additional stations. Vibration work decreased somewhat in comparison with previous years. Other particulars are given. (4) Instrumental work included the construction of remodeled Neumann-Labarre vibration meters and improvements to some other instruments. (5) Various steps were taken to develop greater cooperation in the Western Hemisphere for the study of earthquakes. - V. S.

Bodle, R. R., and Steenland, N. C. Report on Magnetic Survey and Seismological Observations Made in the Vicinity of Paricutin Volcano, State of Michoacan, Mexico, May - July, 1943. U.S. Coast and Geodetic Survey, Washington, D. C., Special Report Issued for Limited Distribution, 1944, 33 pp. (see abs. 7949 in this issue.)

7965. Bruggen, Juan. Contribucion a la geologia sismica de Chile (Contribution to the Seismic Geology of Chile). Santiago de Chile, University of Santiago Press, 1944, 132 pp.

The geology of Chile is described in relation to earthquakes. The causes of earthquakes, seismicity, isoseismal lines, fault movements, etc., are considered. Regional details are given. The material includes evidence from geodetic measurements. - V. S.

7966. Carder, D. S., and Gilmore, M. H. Ground Vibrations. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 35, No. 1, 1945, pp. 13-26

The ground is continuously in vibration. The frequency and magnitude of these vibrations depends on the nature of the ground and the proximity and nature of causative forces. If the ground is disturbed by normal traffic, nonperiodic impacts, or earthquakes, the ground will tend to vibrate in one or more of its natural periods. However, if the disturbing force is periodic, such as that of reciprocating or unbalanced machinery or of a vibrating rigid building or other structure, the frequency of the disturbance will be carried to comparatively great distances in rigid ground such as rock or compact dry earth. If the structure is flexible or if the ground is nonrigid, such as saturated earth, these forced vibrations are quickly damped out. The behavior of a strong-motion seismograph, if it is housed in the basement of a tall building or in the immediate proximity of a tall rigid building, will probably be influenced by the vibrations of that building during a strong earthquake.

If ample precautions are taken to avoid forced vibrations, a simple observation of microseisms will give one or more, though not necessarily all, of the natural periods of the ground. Some of these periods are often so close together, however, that design of earthquake-resistant structures with special reference to avoidance of dominant ground periods is unsafe because, thus far, periods of structures in the design stage have not been accurately predicted. - Author's abs.

7967. Collins, M. P., and Leet, L. D. The Mexican Earthquakes of April 15, 1941, and February 22, 1943 (Abs.). Trans. Nat. Research Council, Am. Geophys. Union, 1944, pt. II, Washington, D.C., pp. 315-316.

Strong earthquakes were felt in several provinces of Mexico on April 15, 1941, and February 22, 1943. The writers studied their records taken at most of the seismograph stations of the Western Hemisphere. (1) Epicenters were located by the modified station-pair method; the latitudes and longitudes are given. There is evidence that the depths are slightly greater than normal. (2) The distribution of initial condensations and dilations from the earthquake of 1941 falls into a quadrantal pattern. Initial motion from the earthquake of 1943 seems to be compression at all stations. (3) The travel-times of the longitudinal waves from both earthquakes are best-described by a series of straight lines with intersections near 16°, 25°, and 45°. Travel-times for shear-waves give a more complicated picture. - V. S.

7968. Dana, S. W. The Amplitudes of Seismic Waves Reflected and Refracted at the Earth's Core. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 35, No. 1, 1945, pp. 27-36.

The author's recent investigation has dealt with the partition of energy among seismic waves reflected and refracted at the earth's core (see Geophys. Abs. 120, No. 7824). In the present study, the amplitudes of the same waves are expressed in terms of the horizontal and vertical components of the ground displacement which they produced at the surface of the earth. The underlying assumptions are stated, the mathematical derivation is presented, and the horizontal and vertical ground displacements (and their ratios) are calculated for different types of waves. The results are tabulated and discussed. Several applications of these calculations to the interpretation of seismograms are indicated. - V. S.

Eby, J. B. Geophysical History of South Houston Salt Dome and Oil Field, Harris County, Tex. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 2, 1945, pp. 210-214 (see abs. 7936 of this issue).

7969. Fu, C. Y. On the Origin and Energy of Oscillatory Earthquake Waves. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 35, No. 1, 1945, pp. 37-42.

A critical survey of the different modes of generation of oscillatory earthquake waves is given. The consequences of the failure of Hooke's law on the dispersion of waves are indicated. The energy of an earthquake is considered from the theory of elasticity with a discussion of Sezawa's result. - Author's abs.

7970. Gamburtsev, G. A. On a Mode of Areal Seismic Prospecting by the Correlation Refraction Method. Compt. rend. (Doklady) Acad. Sci. U.R.S.S., Moscow, vol. 43, No. 6, 1944, pp. 239-241.

In areal seismic surveys the refraction method of first arrival-times has serious weaknesses. It handicaps the construction and use of isotime maps plotted as equal travel-time curves of seismic waves generated at a single shot-point. The difficulties are indicated. The author's correlation refraction method (Geophys. Abs. 113, No. 6900) largely resolves these difficulties and makes indicated isotime maps practicable. This method was employed in the Ishimbaevo region, Russia, in 1942-43. Some findings of general import are discussed: (1) The method offers criteria for judging the regularity of wave correlation; such criteria are the shape and intensity of vibrations, and the comparative geometrical characteristics of travel-time curves. (2) These criteria make it possible to separate in the surveyed area the localities within which the wave type remains constant. (3) Finally, a mapping can be made, for the same locality and for explosions caused at the same point, of several isotime maps referred to several refracting boundaries. - V. S.

7971. Gutenberg, B. Amplitudes of Surface Waves and Magnitudes of Shallow Earthquakes. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 35, No. 1, 1945, pp. 3-12.

A study of amplitudes of surface waves having periods of about 20 seconds is employed to improve the calculation of magnitudes of distant shallow earthquakes. Table 3 gives station corrections; table 4, revised figures for the effect of epicentral distance. It is found that for epicentral distances between about 20° and 175° the average observed amplitudes correspond closely to those calculated with an absorption coefficient $k = 0.0003$ per km. For paths completely outside or inside the Pacific Basin, $k = 0.0002 \pm$ per km., while for paths tangent to its boundary the amplitudes of surface waves with periods of about 20 seconds may be reduced by two-thirds or more (in extreme cases by almost nine-tenths) through reflection or refraction of energy; such seismograms of shallow shocks may be taken as indicating intermediate depth of focus. - Author's abs.

7972. Heck, N. H. The Jesuit Contribution to Seismology in the U.S.A. Thought, Fordham University Press, New York, vol. 19, No. 73, 1944, pp. 221-228.

Jesuit contributions to seismology in the period from 1925 up to present war are outlined. An important part is regional investigation carried on at St. Louis, Florissant, Cape Girardeau, and Little Rock, with close cooperation from Cincinnati. The Jesuit stations also participate in locating earthquakes in other parts of the earth. The total number of active Jesuit stations in the United States in recent years has averaged about 56. Other Jesuit contributions to various fields of seismology are indicated. - V. S.

7973. Jones, W. M. The Use of Differences of Arrival-Times of P as an Aid to Epicentral Determinations in the South Pacific. Dominion Observatory Bull. S-72, Wellington, New Zealand, 1944; also: New Zealand Jour. Sci. Tech., Wellington, vol. 26, No. 3B, 1944, pp. 146-154.

Curves have been drawn, covering the more important seismic portions of the South Pacific, showing the differences in P-arrival times between the Wellington and Brisbane, and between Wellington and Suva, Seismological Observatories, for a normal and for a deep-focus earthquake, according to Jeffreys and Bullen's 1940 Tables. Other curves show the distances from these observatories to points over the same area. The plotting is on a Mercator Projection. The use of such curves in determination of epicentres is briefly discussed. The effects of focal depth are illustrated by diagrams which show the magnitude and direction of the displacement of epicentres when normal focus is assumed for a deep-focus earthquake, and two methods are indicated by which a good approximation to an epicentre can be found directly from the P-arrival times at four or more stations, without making any assumption of focal depth. - Author's abs.

7974. Jones, W. M. Table of Direction-Cosines to Four Figures at Intervals of One Degree in Latitude and Longitude Over a Zone of 60° of Longitude and Latitude from 0° to 40°. New Zealand Jour. Science and Technol., Wellington, vol. 26, No. 3B, 1944, pp. 155-159.

These tables are intended for use in seismological problems where the distance from a given point to any point inside a certain region may be required. The direction-cosines of the normals to the surface are given, for each degree of latitude between 0° and 40°, and for each degree of longitude between 150°E. and 180°. For intermediate points, methods of linear interpolation will suffice for most purposes. These tables have been used by the writer to draw curves showing the differences of arrival-times of "P", at pairs of observatories, from earthquakes in the South Pacific (see abs. 7973). - V. S.

7975. Keller, F. An Electronic Earthquake-Recorder. Trans. Nat. Research Council, Am. Geophys. Union, Trans. 1944, pt. II, Washington, D. C., pp. 304-309.

The author describes the new features of amplifier and recorder apparatus at the amateur seismographic station of New Kensington, Pa. The recorder is designed according to H. Wolfe's principles, with modifications. It operates by alternating current and employs three circuits for the electronic amplifier: A photocell-and-preamplifier circuit, a self-balancing phase-inverter circuit, and a one-stage push-pull amplifier circuit. In operation, the amplifier is excited by a small beam of light. The beam is reflected from the rotating mirror of a galvanometer responsive to the seismograph. The mirror turns to different positions, illuminates a larger or smaller area of the sensitized surface of a photocell, and modifies the cell's output proportionally. These variations operate the electrical recorder. Thus, the connection between the seismograph and the recorder is frictionless. The recorder writes on smoked paper or by ink. The response and wave-form obtained compare favorably with those recorded by the usual observatory-equipment. Drawings of the apparatus and examples of the seismograms are given. (A review appears in Science News Letter, vol. 45, No. 24, 1944, p. 371). - V. S.

7976. Köhler, Reinhard. Messung und Bekämpfung unerwünschter Boden- und Gebäudeschwingungen (Measuring and Counteracting the Undesirable Oscillations of the Ground and Buildings). Zentralblatt Geophys., Meterol. Geodäs., Berlin, vol. 10, No. 4, 1943, pp. 161-169.

Engineering seismology is viewed as a study of the vibrations of the ground and of structures, generated by traffic, machinery, and earthquakes. These lines of investigation are discussed. In the work, seismographs have been replaced with instruments specially adapted to structural problems. Different instruments are used for determining the direction, and the velocity and acceleration, of vibrations. The problems involved are indicated. The remedial measures against injurious vibrations fall into several classes: Removal of causes, adjustment of the structure's own frequencies of vibrations, arrangements preventing the propagation of vibrations, etc. The measures are described, and some criticisms are made. The question of buildings resistant to earthquakes is treated as regards its various elements and solutions. A bibliography is appended. - V. S.

McGuckin, G. M. History of the Geophysical Exploration of the Cameron Meadows Dome, Cameron Parish, La. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 1-16 (see abs. 7942 in this issue).

7977. Neumann, Frank. Period-Amplitude Analyses of Strong-Motion Records. Trans. Nat. Research Council, Am. Geophys. Union, 1944, pt. II, Washington, D.C., pp. 290-294.

The use of actual ground-motion in engineering seismology involves so much laborious integration that a simpler procedure is desirable. The author investigates its possibility. He looks to acceleration as the basic element to use. Acceleration and velocity formulas and graphic methods for constructing envelope-curves are critically examined. Characteristics of different types of envelopes are studied and compared. It is found, with regard to period-amplitude envelopes, that the single curve in the logarithmic form is simpler than the three or more curves necessary to represent the same thing in linear form. The accumulation of a sufficient number of such envelopes would make it possible to construct "master" envelopes. These should represent to a fair degree the maximum expectable earthquake-motions in terms of period, acceleration, velocity, and displacement. But even they would have to be augmented somewhat to take into account the failure of any period-amplitude envelope to provide for the superposing of two or more wave types on each other. Examples of period-amplitude graphs and envelopes drawn to linear scale illustrate the text. - V. S.

7978. Obert, Leonard, and Duvall, Wilber. Microseismic Method of Predicting Rock Failure in Underground Mining. Part 1: General Method. Bureau of Mines Rept. of Investigations 3797, 1945, 7 pp.

Rock failures in underground mining are often preceded by various visible and audible indications of excessive pressures. These indications can only lead to general prediction. The present report describes a microseismic method that permits quantitative prediction. It aims at determining the distribution of stresses existing in the underground mine structures, such as pillars, arches, etc. It is also broadly applicable, for it can be used in all types of hard-rock mining. The report discusses empirical facts underlying the method, the different testing procedures, the recording and analysis of data, and the interpretations obtained therefrom. The physical characteristics of microseisms are described. The equipment of the method consists of a geophone, a high-gain amplifier, a logarithmic amplifier, a power amplifier, and a graphic recorder. The literature dealing with previous work is indicated. Forthcoming reports will deal with other aspects of the microseismic method. - V. S.

7979. Ostrovskii, A. E. On Seismic Logging. Compt. rend. (Doklady) Acad. Sci. U.R.S.S., Moscow, vol. 45, No. 5, 1944, pp. 184-187.

Electric logging is ill-suited to the carbonate type of oil fields, for the electric resistivity of dense limestones differs but little from that of their porous, oil-storing facies. But oil and limestone differ greatly in elastic properties. This circumstance suggests the use of seismic logging. The author has experimented with a new technique marked by the following features: (1) The source of oscillations is placed directly into the well, so that more clear-cut arrival times are obtained; and (2) two closely located seismographs are used so that the velocity diagram of the well can be drawn from the difference between their travel times. In the experiments, the instruments were small, vertical well-seismographs equipped with special devices. Electric caps were set off for explosions at different depths of the well. The seismograms obtained for various levels are presented and analyzed. On their basis, a velocity diagram is drawn for the well in the same way as an electric resistivity diagram. A discussion of these data leads to the following conclusions: (1) The method employed is sufficiently accurate for practical application; (2) it can be used in cased wells; (3) the velocity diagram differentiates between lithological, and sometimes physico-mechanical, properties of rocks; and (4) velocity measurements must be referred to the middle of the distance between the shot-point and the remote seismograph. Other field tests of the method are mentioned. - V. S.

7980. Popescu, I. G. Étude comparative sur quelque tremblements de terre de Roumanie, du type de celui du 10 november 1940 (A Comparative Study of Some Earthquakes in Roumania Similar to that of November 10, 1940). Compt. rend. Acad. Sci. Roum., Bucharest, vol. 5, 1941, pp. 204-223.

A comparative study was made of some former Roumanian earthquakes of the type of the earthquake of November 10, 1940. This study showed that all are characterized by a very extended vibrating area and a long period of vibration. Generally, they begin with strong vertical movements and have their foci in the faulted zone stretching from Vrancea through Foscani to Galatz. Macroseismic data indicate that the focus is about 100 km. deep. - V. S.

7981. Salvatori, Henry. Early Reflection Seismograph Exploration in California. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 17-33.

The first major attempt to employ the reflection method in California was made in 1931. The first results were disappointing, but by the early part of 1932 a prospect near Merced was successfully mapped. The correlation method was found to have limited applicability and the dip method was generally adopted. Most of the early work was performed with side spacing of stations and lines since very close control was not considered necessary to discover the larger structural features which were then of greatest interest. As a result of this early reflection work several important oil fields were discovered among which are the Wilmington and Rio Bravo fields. A brief history of the discovery of these two fields is given and the seismic maps are compared with the later geologic maps compiled from well data. - Author's abs.

7982. Savarenskii, E. F. Seismic Waves Refelected from a Boundary at a Depth of 900 Kilometers (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 6-8.

A study was made of the velocities of longitudinal and transverse waves P_{900} and S_{900} reflected from a boundary located at a depth of 900 kilometers. Such a boundary was selected because it was assumed that at depths less than 900 km. velocities increase faster than at greater depths. The seismograms recorded at the stations of Central Asia during 1934-36 provided the data. On the basis of this material, propagation times were computed for the differences (P_{900}-P) and (S_{900}-S), corresponding to depths between 0 and 800 km. The calculations are described, the formulas cited, and the results presented. Insufficient material has prevented an exact determination of the position of reflecting boundary. - V. S.

7983. Sawdon, W. A. Geophysical Work in Paraguay Indicates Extent of Exploration in South America. Petroleum Engineer, Dallas, Tex., vol. 16, No. 6. 1945, pp. 81-82.

The Union Oil Co. of California has contracted with the Paraguayan Government to explore for oil an area comprising more than 54,000,000 acres in the Chaco territory. This area is flat, marshy, and silt-covered; it bears forest, long coarse grasses, and scrub. The local geology is little known. The Western Geophysical Co. has been retained to perform the geophysical work. At present, seismograph surveys appear to be the most advantageous. One seismograph party is already surveying, and a second crew is being assembled. Current reports indicate that good seismograph records are being obtained to relatively great depth, so that there is no question but that the area can be worked by seismograph. - V. S.

7984. Strautyn, E. F. The Problem of Average Velocities in the Interpretation of Seismic Observations in Western Siberia (in Russian). Akademiia Nauk S.S.S.R., Trudy Seismologicheskogo Instituta, Moscow, No. 106, 1941, pp. 45-48.

In 1939 the Geophysical Trust of U.S.S.R. made a seismic reflection survey of the Western Siberian depression in the regions of Ploskoe and Nazyvaevskoe. The geological evidence pointed to a foundation of hard Paleozoic sandstone, schist, and limestone, covered with a layer of sand and clay. Such composition would result in an increase of average velocity with the depth of penetration of waves. The data of the survey were used to verify this deduction. The average velocity of a reflected wave was computed by the method of quadratic coordinates and plotted against the depth of penetration of the wave. The curve showed, contrary to expectation, that the average velocity increased with depth only up to a certain depth-limit, whereupon it began to decrease; the limit was 900-1,000 meters for Ploskoe, and 1,800-2,000 meters for Nazyvaevskoe. To clarify such conflict of evidence, an empirical determination was made of actual specific velocities by means of "vertical" hodographs. The method is described, and the resulting curves are shown. The hodographs gave a continuous linear relationship between specific velocity and the depth of penetration of waves, thus confirming the initial geological deduction. These findings are analyzed. The conclusion is drawn that the use of curves of average velocity in the investigated regions, and generally in Western Siberia, requires special study and much judgment. - V. S.

7985. Vesanen, Eijo. Über die typenanalytische Auswertung der Seismogramme (Regarding the Interpretation of Seismograms by Means of a Type Analysis). Ann. Acad. Sci. Fennicae, Helsingfors, A.3, vol. 5, 1942.

The seismic waves P and S of different earthquakes were studied for determining their common characteristics. 244 earthquakes recorded at the Helsingfors station during 1925-40 and having epicentral distances between 43° and 84° furnished the material. The detected characteristics served to group the earthquakes into definite types, classes, and subclasses. Further, the maps of local epicentral distribution revealed that there corresponded to a seismic type a certain epicentral grouping or topographic region, to a class a district, and to a subclass an area. These findings lead the author to consider that further studies may establish relationships between seismic characteristics of shocks and topographic characteristics of epicenters. Such knowledge could bring about new and simpler methods of determining distances, locations, and depths of the foci by means of a type analysis of seismograms. Other features of earthquakes may likewise be discovered. The author's study of epicentral groupings has already shown that rapid successions of shocks are not as rare as believed. In some epicentral regions they seem to be the rule rather than the exception. - V. S.

7986. Wolf, Alfred. Motion of a Rigid Sphere in an Acoustic Wave Field. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 91-109.

A rigid sphere in the field of plane acoustic waves in a fluid or in an elastic solid medium is subjected to harmonic forces in the direction of propagation of the waves, and proportional to their amplitude. The response curve is a function of the ratio of the circumference of the sphere to the wave length, and of the ratio of the mass of the sphere to the mass of the displaced medium. In an elastic solid, Poisson's ratio must also be included among the variables.

The response curve in fluids decreases continuously with decreasing wave length. In elastic solid media, the response curve has a maximum which is due to resonance effects. In general, the greater the mass of the sphere the smaller the response except in the neighborhood of resonance in elastic solid media.

The scattering of acoustic waves by a rigid sphere is determined. The potential of scattered waves is developed in a series of spherical harmonics; it is shown that only the first order coefficents are affected by the motion of the sphere. - Author's abs.

4. ELECTRICAL METHODS

7987. Alder, R. L. Advanced Design Provides Maximum Efficiency in Electrolog Service. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 11, No. 1, 1945, pp. 20-23.

The latest improvement in the design of the Lane-Wells Electrolog includes automatic curve recording, steel-shroud multiconductor cable, depth-measuring sheave, sinkers for bad bridging conditions, metal contacts for logging in oil base fluid, etc. These improvements permit faster and more precise work as well as operation in difficult conditions, such as slant holes. Special equipment is also provided for magnetic directional surveys and for temperature surveys in open and cased holes. The **applications** of the Electrolog and of its accessory parts to different problems are described. The typical field unit consists of separate hoist and instrument trucks. In logging, five standard curves are traced, three of which can be recorded simultaneously on the automatic photorecorder. - V. S.

7988. Deegan, C. J. Electrical Logging Widely Employed in Rocky Mountain Exploratory Tests. Oil and Gas Jour., Tulsa, Okla., vol. 43, No. 48, pp. 60-61.

In Rocky Mountain oil fields, the connate waters lack salinity while the permeability of formations is low. These conditions handicap the use of electrical logs: (1) The fresh formation waters make for little self-potential on the logs due to the similarity in salt content between the mud in the hole and the water in the formation; (2) resistivities are often high because fresh waters are poor electrolytes for the conduction of current; and (3) low permeability creates high water saturation even in the producing horizons, so that there may be no sharp line of demarcation between oil zones and water-bearing zones. As a result, electrical logs present in this area an unusual pattern, and a visual interpretation is difficult. Fortunately, calculation methods have been developed for these logs. They permit computation from the electric curves of the amount of water saturation in the formation. This knowledge is valuable in interpretation, and the calculations have now become a routine in this area. - V. S.

7989. Fritsch, V. Notes on the Investigation of Geoelectrical Lightning Hazards. Gerlands Beitr. Geophys., Leipzig, vol. 57, No. 1, 1940, pp. 65-108.

Statistical data are given on the damage due to lightning reported by German insurance companies in 1939. The effect of local variations in soil resistivity on the liability of direct lightning hits and on the protective range of lightning conductors is discussed, and the importance of seasonal variations in the earthing resistance of protective systems is emphasized. With a view to investigating these effects, a test field is described which appears to be particularly prone to damage by lightning. Several cases of past damage, and the methods of investigation to be adopted, are described. - R. H. G., Sci. Abs., vol. 27, No. 561, 1944.

7990. Fritsch, V. Note on the Work Done in 1941 at the Lightning Test Field of Absroth. Gerlands Beitr. Geophys., Leipzig, vol. 59, No. 3/4, 1943, pp. 306-330.

Cases of lightning damage in the test field during 1941 are described (see also abs. 7989). For the neighboring German Province of Saxony, detailed statistical information is given on lightning damage to buildings during 1927-40. Various methods for measuring earthing resistances are discussed and the results obtained with test electrodes are investigated with respect to yearly and monthly variations, and the effect of rainfall. - R.H.G., Sci. Abs., vol 47, No. 561, 1944.

7991. Gabriel, V. G. Application of Electric Transient Method in Oil Exploration. Petroleum World, Los Angeles, Calif., vol. 42, No. 1, 1945, pp. 44-46.

Transient magnitudes of current and of potential arise in an electric circuit when the current has been applied or removed suddenly. The decay and build-up times are a function of impedance and other factors. The electric transient (Eltran) method of oil prospecting makes use of the changes caused by subsurface anomalies in the wave-form of transient characteristics. This method is still in an experimental stage. The author briefly discusses its principles and outlines the contributions of the chief workers, C. and M. Schlumberger, Blau, Hawley, Statham, Rosaire, West, Klipsch, and Blondeau. A table cites the publications describing surveys made with the transient method. - V. S.

7992. Jones, P. J. Characteristics of Electric Logs. Oil and Gas Jour., Tulsa, Okla., vol. 43, No. 33, 1944, pp. 75-81.

An electric log has an SP (self-potential) curve, and it may have three resistivity curves. One of the objectives of electrical logging is to record the resistivity of the pay in reservoirs. However, the resistivity recorded on electric logs may be influenced by several factors. First, there are the diameter of a well bore and the resistivity of the mud in the well bore. Second, mud filtrate may invade some beds and change the resistivity of the invaded region. Lastly, the thickness and the resistivity of pay and non-pay must also be taken into consideration. The SP recorded at a given depth is probably the sum of a number of possible sources of potential. The principal sources of potential, however, are said to be filtration and resistivity potentials. The SP curve is also influenced by the resistivity of mud and by invasion of mud filtrate. Apparently, control of mud resistivity and of filtration characteristics is just as important to obtain reliable SP curves as it is to obtain reliable resistivity curves. - Author's abs.

7993. Jones, P. J. Application of Electric-Log Data. Oil and Gas Jour., Tulsa, Okla., Vol. 43, No. 34, 1944, pp. 270-273.

Probably the first step in the application of electric-log data to production is to check the reliability of the resistivity recorded on an electric log. The next step may be an estimate as to the top and bottom of the pay in a given well and reservoir. The bottom of a pay may be water contact or a gas contact. Deductions for nonpay within the interval between the top and bottom of a pay can amount to a sizable fraction of the interval. Nonpay may be more resistant, or less resistant, than pay. A dense nonpay having a high resistivity is sometimes mistaken for pay. The more important criteria for distinguishing pay from nonpay are discussed. A procedure for estimating interstitial water for the pay found in a well is considered in detail. - Author's abs.

7994. Lewis, W. B. Working Depths for Low Frequency Electrical Prospecting. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 63-75.

Electrical measurements were made on the surface of the earth with low frequency commutated current using nineteen separate frequencies and six electrode separations. Analysis of the data indicates that there is an effect of appreciable magnitude attributable to an interface 6,000 feet below the surface. - Author's abs.

7995. Turkisher, R. I. A Problem in Vertical Electrical Sounding (in Russian Bull. Acad. Sci. U.R.S.S. (Izvestiia), Ser. Geogr. Geophys., Moscow, vol. 8, No. 4, 1944, pp. 154-156.

The effect of an intermediate layer in vertical electrical sounding has been previously investigated by the author (see Geophys. Abs. 120, No. 7858). A special case of this problem is now considered. The electric field of a point-source is situated over a two-layer medium: (1) The upper layer has a thickness "h" and a conductivity "σ" continuous and diminishing linearly from a value σ_0 on the earth's surface to zero at the depth h; and (2) the lower layer is nonconductive and infinite in depth. In the calculations, the equation of a continuous potential of the field of a point-source was used for deducing the formula of apparent resistivity; the derivation is presented. The values of apparent resistivity were computed in their dependence on the distance from the point-source; they are tabulated and plotted into a curve. This curve is discovered to be practically identical with (1) the curve of apparent resistivity for the case of an upper layer having a constant conductivity, and with (2) the curve of apparent resistivity for an upper layer with a constant conductivity and an intermediate layer with a linearly decreasing conductivity, other conditions being equal. Thus, as far as can be judged from resistivity curves, there is no difference in apparent resistivity between upper layers with a constant and linearly diminishing conductivity. - V. S.

5. RADIOACTIVE METHODS

7996. Bulashevich, Iu. P. The Application of the Radioactive Method to the Search of Pegmatites in the Alkaline Belt of the Urals (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Sér. Geol., Moscow, No. 3, 1944, pp. 28-35.

The radioactive method was used in prospecting for pegmatites in the Vishnevye Gory. These mountains form the northern part of the alkaline belt of the Urals; their geology is indicated. At first, tests were made of rock samples by the alpha technique. They showed that the alpha activity of pegmatites was higher than that of the container rocks, and that the pegmatites themselves differed much in activity. These findings indicated the applicability of radioactive prospecting. Then a field survey was made by means of the emanation method. Holes were bored along traverses, and the subsoil air was pumped from them into an ionization chamber and tested for thorium emanation. The results were plotted as emanation profiles; special measures were taken to ensure the comparableness of data. The profiles are described and discussed. The following conclusions are reached: (1) The local pegmatites, or their contacts with container rocks, generate high emanation and can be detected as radioactive anomalies; and (2) distinct differences exist among the minerals of the nepheline-syenite pegmatities as to content of radioactive elements; such content is highest in zirconium and pyrochlorine. - V. S.

7997. Curtiss, L. F., and Brown, B. W. Frequency Meter for Use with Geiger-Müller Counter. Nat. Bur. Standards, Jour. Research, Washington, D.C., vol. 34, No. 1, 1945, pp. 53-58.

The authors describe an improved circuit for reading the rate of pulses from a Geiger-Müller counter. Based on the usual procedure of leveling and rectifying the pulses to charge a condenser, the improvements concern a bridge type vacuum-tube voltmeter to read the voltage on the condenser and an arrangement to compensate parasitic potentials developed in the rectifier for the pulses. Since one small transformer provides an adequate source of potentials, the circuit is particularly useful in portable instruments. Great care has been taken to design a circuit that is independent of the voltage of the alternating current mains from which it is operated. A modification of the circuit for rapidly decaying sources is also described. - Nat. Bur. Standards, Tech. News Bull. 333, 1945, p. 2.

7998. Gemert, A. G. M. van, Hartog, H. den, and Muller, F. A. Measurements on Self-Quenching Geiger-Mueller Counters, I-II. Physica, Hague, vol. 9, 1942, No. 6, pp. 556-564, and No. 7, pp. 658-664.

1. Counters with vapor admixtures and techniques of measurement are briefly outlined. Next, there is described a determination of the temporal course of the current in counters at discharge. The voltage was delivered to a cathode-ray oscillograph through a small series-resistance. At the same time, the counter was illuminated at different places throughout its length

with a gamma-ray source. It was found that Trost's relationship between current and time $i = k/t$ for the discharge can be extended to apply to the shortest measurable value of t, 0.05 microsec. But the conception of current must be further adapted to the conditions in the counter. Some other findings are given. Montgomery's hypothesis of induction generated by a charge wandering in space is followed through with calculations. - V. S.

2. New apparatus has been developed for precise and simple determinations of the resolving power and charge size of counters. Two models are described. One measures the charge size by making it dependent upon the voltage; this is accomplished by means of an electron-ray oscillograph and a condenser attached to the counter. The other also uses the oscillograph and measures both the charge size and the resolving power. A calculation bearing on these values and based on a simple conception is presented by the author; it agrees well with empirical measurements. Certain conclusions are made, which should be useful both theoretically and practically. - V. S.

7999. Jezewski, M., and Miesowicz, M. Étude des compteurs de Geiger-Müller (A Study of Geiger-Müller Counters). Jour. Phys. Radium, Paris, ser. 8, vol. 1, 1940, pp. 221-230.

The optimal use of Geiger-Müller counters was studied experimentally at the Institute of Physics, Academy of Mines, Cracow. The following results were obtained: (1) When the counter is filled with gas, such as air, hydrogen, or noble gases, a relatively higher electric series-resistance must be employed. The purity of the gas should not be too high. Cathode cylinders treated with a 30-percent nitrous acid successfully passed the experimental tests. The anode-wire material was found to be of no consequence, as had been discovered by other investigators. (2) Substantially more advantageous are the counters filled with vapor, such as alcoholic or acetone vapor, etc.; acetone is preferable because of its higher vapor pressure. The performance of these counters is illustrated by oscillograph records made of the course of pressure during the discharge. The average strength of the current during the much shorter discharge is here about 100 times greater than in gas filled counters. This advantage is explained by higher specific ionization in vapors. - V. S.

8000. Marsden, E., and Watson-Munro, C. Radioactivity of New Zealand Soils and Rocks. New Zealand Journal of Science and Technology, Wellington, vol. 26, No. 3B, 1944, pp. 99-114.

Measurements of the alpha-ray activity of various soils and rocks in New Zealand, Australia, and Great Britain are recorded. Analysis of the results shows that soil radioactivities are dependent upon the rocks from which they are derived rather than the type of soil. Basalts, andesites, rhyolites, and limestones gave low readings, while granites and greywackes gave high readings of alpha-ray activities in ionization currents $\times 10^{18}$ /cm.^{2}. These results were confirmed in the case of greywackes and basalts by observations with the gamma-ray chamber. The gamma-ray activity of potassium salts in the samples influenced the results considerably. - Authors' abs.

8001. Maxwell, C. T. Radioactivity Economics. California Oil World, Los Angeles, vol. 37, No. 18, 1944, pp. 6-9.

The value of radioactivity logging in locating cased-off potential producing zones in old wells is discussed. Radioactivity logging not only indicates where the pipe should be perforated to obtain maximum production but also shows whether the expected zone is present or not. Frequently it locates potential zones that are not even suspected. - Author's abstract.

8002. Milatz, J. M. W., and Velden, H. A. v. d. Quantitativity of Geiger-Counters for β-Rays. Physica, Hague, vol. 9, No. 2, 1942, pp. 169-176.

By means of measurements on the quantitativity of well-degassed Geiger counters for β-rays it is shown that the probability of the production of a kick when a pair of ions is formed amounts to one. - Author's abs.

8003. Vernadsky, V. I. Radiogeology and Its Significance for the Geology of Today (in Russian). Internat. Geol. Cong. Rept. of 17th Sess., Moscow-Leningrad, 1937, vol. 1, Moscow, 1939, pp. 215-239.

The development of radium research is outlined. C. Schuchert and the committee of G. Knopf in Washington demonstrated the applicability of radioactivity to geology in 1924-31; their studies showed that the determination of time by radioactive disintegration agrees with geological determination. Strutt, Jolly, Rutherford, von Grosse, and Khlopin worked on problems of radioactive heat, effects on uranium, geological processes, geological age, etc. The author is concerned with geological thermodynamics and time determinations viewed in the light of radiogeology. He sees here three basis problems: (1) The maximum age of the regions of the planet connected with metamorphism; (2) The precise scale, in decamiriads, of all geological systems; and (3) the duration of geological processes developing in the earth's crust. His view is that all the factors necessary for a complete cosmogenic explanation are reducible to the power, duration, and energy-output of radioactive processes in the earth. - V. S.

8004. Wickman, F. E. On the Emanating Power and the Measurement of Geological Time. Geol. För. Förh. Stockholm, 1942, vol. 64, 1943, pp. 465-476.

Unless taken into account, the emanating power may, in certain cases, be a source of error in age determination. Formulae are given and plots of AcD/RaG with RaG/UI for Swedish kolm ("diffusion age" 442 million years, compared with previous estimates ranging from 388 to 770 million years), thucholite, and uraninite. - L. J. S., Mineralog. Mag., London, vol. 27, No. 187, 1944, p. 69.

8005. Winter, A. B. A New Application for the Neutron Log. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 10, No. 4, 1944, pp. 26-27.

Some purely physical features of oil wells affect radioactivity logs. Such features are: Entering a casing string from open hole, leaving the top of a liner, meeting fluid level inside casing, etc. Neutron curves respond to these features by larger shifts than gamma-ray curves. Since information on these subsurface conditions is valuable in itself, a new field of application is thus opened for neutron logging. The author lists recordable physical features of wells, indicates the character of corresponding shifts on neutron curves, and discusses the practical uses of them. An example of application is described. - V. S.

6. GEOTHERMAL METHODS

8006. DeLury, J. S. Generation of Magma by Frictional Heat. Am. Jour. Sci., New Haven, Conn., vol. 242, No. 3, 1944, pp. 113-129.

Indications that the crust of the earth is strong and thick into depths of 700 kilometers or more, together with evidence that abundant igneous rocks correspond in composition to shallow earth layers, require an appeal to magma sources other than the subcrustal weak shell of isostasy which is commonly accepted as an inherited and potential source. A hypothesis is offered to explain the origin of magmas within the crust by appealing to mechanical sources of heat. The failure of a thick crust, brought about by thermal contraction of the earth, is considered to be effected by a piecemeal operation involving different parts separately during a long period of time, rather than by a brief and final collapse embracing the entire structure. Elastic downwarping of the crust to form geosynclinal depressions is followed by a long process of failure of the lower and major part along one or several underthrust fault planes. This failure provided a plausible explanation of plutonic earthquakes. The outer shell of the crust is the last part to fail. Owing to its greater compressibility it is not compelled to yield until after deeper layers have been relieved of the horizontal compressive stress. This manner of failure prescribes the slipping of large areas of thick crustal shells over and under each other with a development of enormous quantities of frictional heat. Magmas are accordingly created in more or less continuous sheets along nearly horizontal fault planes beneath wide regions. Thermal expansion leads to elevation of these regions, so that, when the outer crustal layer fails, a "head" exists above the sheet of magma derived in the failure. Regional subsidence drives the magma forcefully into regions of lower "head" and in this process additional mechanical heat for magma generation is supplied by friction in the highly viscous magma. Applications of the hypothesis to explain major deformations near the surface are indicated. - Author's abs.

8007. Kraskovsky, S. A. Geothermal Measurements in Coal Districts (in Russian). Akademiia Nauk S.S.S.R., Trudy Komissii po Geotermike, Moscow, Vypusk I, 1941, pp. 12-16.

The author reviews 27 geothermal surveys made of coal districts in various parts of the U.S.S.R. during 1907-33. The districts were distributed over central Russian Provinces, Don Basin, Caucasus, Poland, Northern Siberia, etc. The depth of measurements ranged from 28.0 to 819.3 meters. The results showed temperatures varying from 4.5° to 34.4°C. and geothermal gradients ranging from 24.6 to 38.4 m/C°. Some surveys are described in detail. The measurements made near Stalino beginning with 1931 were combined with methodological investigations. They showed that different boreholes can have identical curves of thermal distribution through depth. An experiment indicated that an 8 hours' cold washing of a borehole had no material effect on its thermal regime. The average thermal gradient in the Stalino district was 33.3 m/C°. Generally, the geothermal gradients in coal districts were small. The causes have been studied theoretically by N. Korytnikova in 1936. She found that the heat generated by the coal cannot be a sufficient explanation of small geothermal gradients, as Höfner had supposed. - V. S.

7. GEOCHEMICAL METHODS

8008. Henderson, H. I. Soil Analysis for Prospecting. Petroleum Engineer, Dallas, Tex., vol. 15, No. 9, 1944, p. 116.

The Surface Analysis Co. has developed a process of analyzing the soil for accumulations of hydrocarbons. This process is being used now in geochemical surveys for oil. A brief outline is given of the principles underlying the analysis, the difficulties in distinguishing between hydrocarbons of different origin, and the conditions favorable to practical application. The conditions include unconsolidated overburden, water on the surface, and topography advantageous for the accumulation of transformed hydrocarbons. - V. S.

8009. Souther, R. E. Application of Mud-Analysis Logging. Geophysics, Menasha, Wis., vol. 10, No. 1, 1945, pp. 76-90.

The mud analysis logging system, now widely used for exploratory and routine drilling, continuously analyzes and records the oil and gas content of mud returns from wells being drilled by the rotary method. Oil and gas detected in the returning drilling fluid indicates oil or gas in the formation penetrated by the bit. Results of the continuous analyses are instrumentally correlated to the depths and formations from which the showings originated. A second useful phase of the system plots accurately and in detail rate of penetration or drilling speed on the log as a function of depth. Trucks and trailers provide a mobile housing for all of the mud-analysis equipment so that it may be moved rapidly from well to well.

Applications of the method may be divided into two classes:

1. Routine drilling in proved areas where it eliminates unnecessary coring and locates gas caps and completion zones.

2. Exploratory drilling in which it minimizes coring by indicating for testing purposes porous zones containing oil and/or gas.

Mud-analysis logging can be practiced in areas where the electrical log cannot be used due to high salt content or other local conditions, where dangerous hole conditions make interruption of drilling operations for coring inadvisable, and for evaluating gas zones where cores are difficult to interpret.

In addition, each mud-analysis logging unit contains equipment to obtain information useful in eliminating wash-outs, in predicting and preventing blow-outs, and in controlling drilling mud characteristics. - Author's abs.

8010. ZoBell, C. E. Transformation of Organic Material into Petroleum - Bacteriological and Sedimentation Phases. Am. Petrol. Inst., New York, Annual Report of Progress - Fundamental Research on Occurrence and Recovery of Petroleum, 1943, pp. 103-104.

Petroleum is considered to be formed from organic materials accumulating with sediments. Acting on this hypothesis, the Scripps Institution has conducted investigations for several years on the role of bateria in such transformation. The method employed consisted in studying the recent sediments with a view to learning about the conditions under which the older oil-bearing horizons have been formed and can be discovered. The area investigated covered the source sediments off the coast of southern and lower California. The results to date substantiate the view that bacteria are important agents affecting the transformation of organic matter and influencing physiochemical and geological conditions in sedimentary deposits. A number of particular observations are indicated, and the program of further research is outlined. - V. S.

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

8011. Bays, C. A., and Folk, S. H. Geophysical Logging of Water Wells in Northeastern Illinois. Illinois State Geol. Survey Circ. 113, Urbana, 1944, 19 pp.

Experimental studies have been conducted in Illinois for testing application of geophysical methods to water wells; information was also sought on the water-producing zones and conditions in northeastern Illinois. A number of different instruments were run in wells to obtain various types of data on the wall rock and fluids. As the investigations progressed, modifications of the usual techniques, measurements, scales, and interpretative practices were developed. In addition, tools and techniques were devised for particular water-well problems. The authors designate the records obtained through these methods as "geophysical logs". Geophysical logs have been made for more than 20 wells in northeastern Illinois, and from them many useful principles were worked out. The geophysical data were closely integrated with geological and production data with a view to obtaining a basis for generalization and specific recommendations. - V. S.

Digitized by Google Original from THE OHIO STATE UNIVERSITY

8012. Cederstrom, D. J. Selected Well Logs in the Virginia Coastal Plain North of James River. Virginia Geolog. Survey Circular 3, University, Va., 1943, 82 pp.

In 1937 the Virginia Geological Survey, in cooperation with the Federal Geological Survey, undertook an investigation of the ground-water supplies of the coastal plain of Virginia. The author presents data regarding the logs of 83 wells on that plain, north of James River. The depth and thickness of the layers recorded are listed for each well. The local geology is outlined. The material of the survey south of James River will also be published. - V.S.

8013. Cram, I. H. Team of Geology and Drill Has Responsibility of Solving Industry's Oil-Finding Problem. Independent Petrol. Assoc. America Monthly, Tulsa, Okla., vol. 15, No. 6, 1944, pp. 46-48.

The oil industry has, fundamentally, two prospecting tools--geology and the drill. Geology utilizes all available instrumentalities and interprets the final results. The existing instrumentalities include geophysics which provides scientific apparatus and techniques for gathering geological data. Geophysicists are particularly needed as designers and operators of geophysical instruments and as interpreters of their findings. At the present time geophysical methods should be approached especially from the standpoint of the independent producer. The author briefly reviews the Fitts-pool discovery and some geophysical methods from this angle. - V. S.

8014. Heiland, C. A. Geophysical Prospecting Increased 30 Percent in 1944. World Petrol., New York, vol. 16, No. 3, 1945, pp. 46-49.

Condensed from a report by the author prepared for the American Institute of Mining and Metallurgical Engineers and published in Mining and Metallurgy, vol. 26, No. 458, 1945, pp. 99-104 (see Geophys. Abs. 120, No. 7883). The data of F. H. Lahee on productive and dry wildcats in 1943, cited in both versions of Heiland's report, have been indicated in Geophys. Abs. 118, No. 7596. They may be restated in fuller form. The productive wildcats in 1943, when grouped under methods of exploration, constitute the following percentages of the total number of wildcats drilled in that year: (1) Sundry nontechnical methods, 4.5 percent productive; (2) unknown methods, 7.5 percent productive; (3) geology, 18.5 percent productive; (4) geophysics, 21.5 percent productive; (5) geology and geophysics, 21.5 percent productive; and (6) total percentage productive, 17.0 percent. - V. S.

8015. Kothny, G. L. The Application of Oil Well Surveying Instruments and Technical Services in the Mining Industry (abs.). Econ. Geol., Lancaster, Pa., vol. 40, No. 1, 1945, p. 89.

This paper discusses some of the outstanding developments made in the use of well surveying instruments and the drilling techniques by the petroleum industry. It describes various types of instruments in use, their requirements and methods of operation, the benefits obtained from their use and how these instruments can be obtained. Instruments used by the mining industry are also briefly described and their performance compared. The adoption by the mining industry of the techniques used in the petroleum industry is advocated in view of the beneficial results to be obtained. A simple method of determining the direction and the angle of the core samples taken off core trays is also briefly described. - Author's abs.

8016. Levings, W. S. Aerogeology in Mineral Exploration. Colorado School Min. Quart., Golden, Colo., vol. 39, No. 4, 1944, 77 pp.

The purpose of this paper is to show the possibilities of geological observation from the air as an accessory to ground exploration for mineral deposits. The contents cover the various types of aerial photographs, aerial equipment, flying routines, advantage of air surveying, conditions and criteria of geologic inference from air views, importance of experience in interpretation, etc. Salient features of the aerial photographic map are indicated. The methods applied in oil exploration are broadly contrasted with those in the search for ore deposits. Attention is given to the successes and techniques of aerogeology in various countries. In conclusion, the possibilities of color photography and the helicopter are examined. A bibliography is appended. (A review appears in South African Min. Eng. Jour., Johannesburg, vol. 55, pt. 2, No. 2710, 1945, pp. 497-499.) - V. S.

8017. Levorsen, A. I. The Search for New Oil Provinces. Petroleo Interamericano (Printed in Spanish and English), Tulsa, Okla., vol. 2, No. 3, 1945, pp. 98-103, 142-157.

The vast majority of oil and gas pools consist of varying combinations of structural and stratigraphic factors. So far prospecting has been mostly concerned with structural factors. It now becomes necessary to look for stratigraphic factors. Two geological conditions offer particular promise in the latter search: (1) Wedge belts of porosity in the reservoir rock; and (2) successive geological layers, each separated by an unconformity and having its own independent oil and gas geology. These conditions are discussed in their relation to oil and gas accumulations. It is pointed out that they can be discovered by the resolution of the greatest possible mass of geophysical data into stratigraphy and sedimentology, as well as into structural geology. Such approach requires a preparation and study of facies maps, lithologic maps, isopach maps, paleogeographic maps, paleogeologic maps, quantitative and qualitative sedimentation investigations, and detailed stratigraphic analyses of porous sedimentary rock units. The work involved in accumulating, organizing, and reexamining the underlying information is outlined briefly. - V. S.

8018. Miller, F. S. Graphs for Obtaining True Thickness of a Vein or Bed. Econ. Geol., Lancaster, Pa., vol. 40, No. 1, 1945, p. 91

This paper presents graphs from which can be read the correction factor that must be applied to the apparent thickness of a bed or vein, as measured along a drillhole or traverse, in order to obtain the true thickness. - Author's abs.

8019. Oil and Gas Journal. Expansion of Foreign Exploration Calls for More Geophysical Activity, S. E. G. is Told. Tulsa, Okla., vol. 43, No. 49, 1945, pp. 94-96.

The Petroleum Administration for War made a report at the meeting of the American Association of Petroleum Geologists in April 1945. This report revealed that, according to the world petroleum-supply programs for 1945 and 1946, foreign countries in the Eastern and Western Hemispheres will not be able to meet their requirements for oil from the existing fields. Therefore, exploration for new oil fields is being expanded. Geophysical methods play an increasing role in this work. During the second half of 1944, about 65 geophysical crews were engaged each quarter in foreign operations. Approximately two-thirds of the investigations were seismic and the rest almost entirely gravimetric. 94 percent of all crews operated in the Westen Hemisphere. For the entire year 1945, geophysical programs contemplate an increase of 50 percent in the number of foreign crews. Seismic investigations are again expected to make two-thirds of the total exploration. The proportion of crews allotted to the Western Hemisphere remains close to 95 percent. In the P. A. W. statistics, foreign geophysical operations are differentiated by areas and methods; the foreign countries are grouped into four divisions: (1) Mexico, Central America, West Indies; (2) Caribbean; (3) other South America; and (4) Eastern Hemisphere. - V. S.

8020. Petroleum. The British Oilfield. Petrol., London, vol. 7, No. 11, 1944, p. 204.

An oil field has been discovered in Britain during the present war. The discovery is the result of many years of search. At the outbreak of hostilities a total of 20 areas had been explored. This work comprised 61 test wells measuring 60,000 feet and covered a substantial portion of the islands. Geophysical methods contributed to this exploration; the seismic method was found to be the most suitable. - V. S.

8021. Rich, J. L. Oil Possibilities of South America in the Light of Regional Geology. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 5, 1945, pp. 495-563.

The petroleum possibilities of a region depend on the presence of thick sections of sedimentary rock of favorable facies, preferably marine; on the conditions of sedimentation when the rocks were deposited; and on their subsequent structural history. In assessing the petroleum possibilities of South America these factors have been taken into account in so far as available data permit. The principal sedimentary basins are indicated on maps and the features of each discussed from the point of view of the petroleum geologist. The survey indicates large areas that are potentially petroliferous, and an attempt has been made to classify them into three groups: (a) Most favorable, (b) moderately favorable, and (c) possibly petroliferous but for various reasons less promising than the two preceeding groups. An unexpected result of the study was the suggestion that the eastern half of the great sub-Andean sedimentary trough may hold more accessible oil than the western half. Inaccessibility, unfavorable climate, and dense vegetation cover will retard exploration and development of the sub-Andean belt from northern Bolivia to Central Colombia. - Author's abs. (References are made to some geophysical surveys. A bibliography is appended. - V. S.).

8022. Rust, W. M., Jr. How to Judge Geophysical Methods. Oil Weekly, Houston, Tex., vol. 117, No. 6, 1945, pp. 56-57, 70.

After the war, many new methods and modifications of old methods are likely to be offered by geophysicists for improving oil search. The author advances five criteria for recognizing among such offers the proposals of real merit. (1) A sound method must be based on physical measurements of some property of the earth. (2) The measurements must give reproducible results. (3) The cost must not exceed that of existing methods. (4) The data must be significantly related to the occurrence of oil. This criterion can be applied theoretically or empirically; both applications are discussed. (5) The method must have a teachable interpretation. Generally, the author believes that improvements in instruments and techniques will be helpful in achieving greater efficiency in exploration, but that advances in the thinking of geophysicists are even more important. - V. S.

8023. Singewald, J. T., Jr. The Oil and Gas Play in Maryland. Jour. Assoc. Am. State Geol., Trenton, N. J., vol. 15, No. 4, 1944, p. 24.

In Maryland, oil and gas beds outcrop on the Western Shore and on the northern part of the Eastern Shore. Geophysical exploration has been made mostly in the latter region; water wells here are generally not deep enough to give definite geological information. The Sun Co. made a magnetometer survey several years ago, seemingly the only geophysical work prior to last year. Last winter the Ohio Co. had a seismic crew in the area, and a well site was selected about 6 miles east of Salisbu y. Since June the Pure Oil Co. has had a seismic crew at work in southern Delaware. More recently, the Shell Oil Co. undertook a gravimeter survey. - V. S.

8024. Yacimientos Petroliferous Fiscales (Argentina). Memoria de Y.P.F. correspondiente al año 1943 (Annual Report of the Argentine Administration of Government Oil Fields for 1943). Bol. Inform. Petrol., Buenos Aires, vol. 21, No. 242, 1944, pp. 23-25.

The Argentine Administration of Government Oil Fields (Y.P.F.) has issued its annual report for 1943. It contains a section on geophysical exploration. The latter describes, in usual form, the localities surveyed, methods employed, acreage covered, and geological particulars. The material is organized by Provinces, comparisons are made with data for 1942, and a map of explored areas is appended. Geophysical surveys in 1943 generally continued the work of previous years. (See Geophys. Abs. 115, No. 7214, and 120, No. 7902). - V. S.

8025. Zanetta, A. J. La investigación y la industria petrolífera (Research and the Petroleum Industry). Bol. Inf. Petrol., Direccion General de Y.P.F., Buenos Aires, vol. 21, No. 241, 1944, pp. 11-30.

The author discusses the various applications of scientific research to the petroleum industry in Argentina. Among these applications he includes geophysical exploration. The seismic, gravitational, magnetic, geochemical, electrical, and radioactive methods are briefly outlined. - V. S.

9. NEW PUBLICATIONS

8026. Rinehart Oil News Co. of Oklahoma. Rinehart's Yearbook, 1945. Tulsa, Okla., Ira Rinehart Oil Report Publication (mim.), 1945, Price, $10.00.

The Rinehart's Yearbook of 1945 gives information on oil discovery and development during 1944 in 17 States: Texas, New Mexico, Oklahoma, Kansas, Mississippi, Louisiana, Alabama, Georgia, Florida, Arkansas, Colorado, Wyoming, Montana, Nebraska, Missouri, Iowa, and South Dakota. The material is arranged by states. It covers such subjects as new field discoveries, reviews of development, analysis of exploration, oil production, and extensions of old pools, as well as local problems. The data include statistics and numerous maps. Special attention is devoted to Mississippi's growth as an oil-producing State. - V. S.

8027. Van Tuyl, F. M., and others. Review of Petroleum Geology in 1944. Colorado Sch. Mines Quart., Golden, Colo., vol. 40, No. 2, 1945, 136 pp. Price $1.00.

The purpose of the review and the method of acquiring the information presented are discussed. The subject matter includes important news items and constructive developments in basic geology as well as in petroleum geology and borderline fields, as revealed by a search of the literature and the canvass of several leading workers in the petroleum industry. Only the more important contributions to the literature of more than usual general interest are digested. Many other publications of more local interest are listed in the comprehensive bibliography at the end of the report. - Authors' abs.

10. PATENTS

8028. Master Control for Electric Seismographs. E. J. Shimek, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U.S. Reissue Patent 22,535, issued Aug. 22, 1944.

A method of recording seismic waves initially of high amplitude, thereafter of intermediate amplitude and finally of low amplitude, which comprises amplifying and recording the first of said high-amplitude waves, then substantially reducing the amplification and recording the remaining high-amplitude waves, thereafter increasing at a predetermined rate for a predetermined time the amplification and recording said waves of intermediate amplitude, and thereafter rapidly increasing the gain in amplification to a maximum and recording said seismic waves of low amplitude. - Claims allowed, 10.

8029. Vibration Detector. D. S. Muzzey, Jr., Houston, Tex., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,353,920, issued July 18, 1944.

In a system for detecting mechanical oscillations in a medium subject thereto by observing variations in an electric current responsive to said oscillations, an electrolytic cell adapted to be placed in contact with said medium, said cell confining an electrolytic liquid, two electrodes held in rigid relationship with regard to each other in contact with said liquid, one of said electrodes having a reduced area forming substantially a point contact with said liquid, said area being of the order of two thousandths of a square inch, and the other electrode having an extended area of contact with said liquid, and means for passing between said electrodes a direct current density increasing toward said first electrode. - Claims allowed, 1.

8030. Measuring Instrument and Method. O. S. Petty, San Antonio, Tex. U.S. Patent 2,357,356, issued Sept. 5, 1944.

In apparatus for measuring displacement of movably supported mass in response to gravity (gravimeter), the extent of such displacement being affected by temperature variation, the combination with a first condenser, the capacity of which is variable in response to displacement of said mass, of a second condenser of which the capacity is affected neither by gravity nor by temperature variation, a third condenser of which the capacity is unaffected by gravity but variable in response to temperature change, an electrical circuit of which the output is a measure of the capacity of a condenser included therein, and means for selectively including, as the condenser in said circuit, any one of the said condensers. - Claims allowed, 10.

8031. Measuring Instrument. A. F. Hasbrock, San Antonio, Tex., assignor to O. S. Petty, San Antonio, Tex. U.S. Patent 2,357,822, issued Sept. 12, 1944.

In a force responsive instrument (gravimeter), the combination of a yieldingly suspended member of means for restricting laterial and vertical displacement of said member during transportation of said instrument, said means including a plurality of elements mounted for adjustment toward and away from said member, said member having a plurality of surfaces inclined in opposite directions at acute angles to the vertical and so positioned with respect to said elements as to engage the latter when said member is subjected to displacement in excess of a predetermined minimum, each of said elements being positioned for engagement with one only of said surfaces. - Claims allowed, 12.

8032. Electrical Displacement Vibrometer. O. F. Ritzmann, Aspinwall, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U.S. Patent 2,359,245, issued Sept. 26, 1944.

An electrical displacement vibrometer comprising a mass, a cantilever spring suspension for said mass, a pair of flexible resistance members connected in series and mounted on said spring suspension to bend in displacement of said mass and to vary the resistance of both in a similar manner. - Claims allowed, 3.

8033. Well Logging and Apparatus; Hart Brown and H. S. Ribner, Houston, Tex.; said Ribner assignor to said Brown. U.S. Patent 2,359,894, issued Oct. 10, 1944.

An apparatus for lowering into a well bore for well logging including two pairs of vertically spaced inductors, the inductors of each pair being angularly spaced in two planes about a vertical line in the well, the coils in each vertical plane being connected in series oppositon whereby two differential potentials are induced in the coil groups, means for combining said potentials, and means for recording the resultant potential. - Claims allowed, 1.

8034. Gun Perforator. G. F. Turechek, Los Angeles, Calif., assignor to Lane-Wells Co., Los Angeles, Calif., a corporation of Delaware. U.S. Patent 2,360,024, issued Oct. 10, 1944.

A gun perforator comprising: a gun body defining at least one longitudinally extending ignition passage, a plurality of transversely extending gun bores communicating with said passage, and a plurality of transversely directed cartridge bores also communicating with said passage; bullets for said gun bores; and cartridges and seal plugs for said cartridge bores. - Claims allowed, 13.

8035. Apparatus for Recording Seismic Waves; J. P. Minton, Dallas, Tex., assignor to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U.S. Patent 2,360,507, issued Oct. 17, 1944.

In a system, for recording seismic waves which have been created in the earth's surface and detected at a plurality of stations by modulating a common high frequency carrier wave at the frequency of the seismic waves, having amplifiers for independently amplifying the resultant signals from each station and recording devices for producing independent traces of a seismogram, the combination of means for producing an output signal for recordation on a trace of said seismogram which is a composite signal from a group of said stations comprising a balanced bridge full wave rectifier in each amplifier circuit in said group, an output circuit, means connecting said full wave rectifiers in parallel with each other and with said output circuit, means for filtering the carrier wave from the mixed composite signal applied to said output circuit, and means for applying said composite signal to one of said recording devices for recordation on a trace of said seismogram. - Claims allowed, 5.

8036. Depth Measuring Apparatus; Marcel Schlumberger, Haute-Garonne, France, assignor, by measne assignments, to Schlumberger Well Surveying Corp., Houston, Tex., a corporation of Delaware. U.S. Patent 2,361,064, issued Oct. 24, 1944.

In depth determining apparatus, a signalling device comprising a frame adapted to be lowered into a borehole, a flexible casing in the frame, switching means having spaceable switch contacts in the casing, one of said contacts being grounded to said frame, a single insulated conductor connected to another of said contacts and grounded at the surface of the earth, a source of electrical energy for energizing the circuit including said conductor, means responsive to the current flow in said circuit, and an actuator for said switching means, said actuator extending downwardly from the frame and being adapted to operate said switching means when it engages a solid object. Claims allowed, 7.

8037. Radiological Exploration System; A. M. Cravath, San Francisco, and G. L. Hassler, Berkeley, Calif., assignors to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U.S. Patent 2,361,274, issued Oct. 24, 1944.

In an apparatus for the radiological surveying of boreholes, a housing adapted to be lowered into a borehole, said housing comprising an ionization chamber, an electrostatic alternator comprising stator and rotor plates, and an amplifier tube, the grid of said tube forming a system of limited electrostatic capacity with one plate of said alternator and the collecting electrode of said chamber, means for supplying to said chamber and said tube an operating voltage, means for periodically varying the capacity of said system by displacing the plates of said alternator with regard to each other, potentiometer means connected between the other plate of said alternator and the other electrode of the ionization chamber for balancing out the effect of fluctuations of the supply voltage on said alternator by applying a potential proportional to said fluctuations between said alternator plates, and means for indicating the plate current of said amplifier tube. - Claims allowed, 4.

8038. Well Survey Method and Apparatus; R. E. Fearon, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,361,389, issued Oct. 31, 1944.

In an apparatus for geophysical exploration within a well bore by the use of an ionization chamber arranged to control the magnitude of a very small substantially continuously flowing electrical current in response to the intensity of the radiations impinging upon it, the improvement which comprises means to apply a periodically varying capacity to a voltage resulting at least in part from the current in the ionization chamber, an amplifier controlled by the pulsating voltage which results, and recording means controlled by the output of said amplifier to record the current in the ionization chamber. - Claims allowed, 30.

8039. Seismic Surveying; O. S. Petty, San Antonio, Tex. U.S. Patent 2,361,648, issued Oct. 31, 1944.

A system of recording artificial seismic waves of varying amplitude on a record strip of limited uniform width comprising a seismometer for converting said seismic waves into electrical wave form energy, a thermionic valve amplifier for said electrical wave form energy, and a recorder operable by the output of said amplifier, said amplifier including at least one resistance coupled stage having a coupling condenser and a grid resistor, the capacity and resistance of said condenser and resistor respectively being such that the major portion of the charge impressed on said condenser by high amplitude waves is discharged through said resistor over a period of not substantially less than one-half second. - Claims allowed, 2.

8040. Leveling Device for Gravimeters; P. H. James, Houston, Tex., assignor to R. H. Ray, Inc., Houston, Tex., a corporation of Texas. U.S. Patent 2,362,135, issued Nov. 7, 1944.

In an apparatus of the class described the combination of a device to be leveled, hydraulically operable means controlled from a remote position for moving said device to a level position, means for indicating the level position of the device and inclination from such position, said last mentioned means comprising a housing, an inverted pendulum mounted in said housing to tilt when the housing is moved from a level position, and indicating means operable to indicate when the instrument is level and to indicate the direction of tilt when the instrument is tilted. - Claims allowed, 5.

8041. Radioactivity Logging; Daniel Silverman, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,362,164, issued Nov. 7, 1944.

A method of determining the radioactivity of the material forming the walls of a well including the steps of lowering into said well to each of a plurality of known depths an ionization chamber containing an inert gas at superatmospheric pressure and at least two insulated electrodes, intermittently discharging a charged condenser through said electrodes adjacent said chamber, said discharge varying in accordance with the radioactivity of said material, recharging said condenser to a predetermined maximum potential after each such discharge, producing a pulsating electric signal by said intermittent charging and discharging of said condenser, one characteristic of which varies with said intermittent discharge through said electrodes, and measuring the variation in said characteristic of said signal as said chamber is lowered to each of said known depths. - Claims allowed, 11.

8042. Well Testing Apparatus; M. C. Johnson, Winterset, Iowa. U.S. Patent 2,363,793, issued Nov. 28, 1944.

A device adapted to be lowered into a deep well by means of a measuring cable to obtain a sample of the fluid in the strata of the wall of the well at a predetermined depth, comprising a receptacle having an inlet opening in one side near its upper end, a yieldable nipple in said opening having one end projecting outwardly from said side and adapted to engage the adjoining side wall of said well, power actuated means for forcing said receptacle laterally to cause said nipple to engage said wall and to seal said opening against drilling fluids, a valve for said inlet opening, yieldable means maintaining said valve in a closed position, power actuated means for opening said valve, and remote controlled means for each of said power means controlling each of said power means independently. - Claims allowed, 7.

8043. Apparatus for Electrical Exploration; D. S. Muzzey, Jr., and R. Du Wayne Miller, Houston, Tex., assignors to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U.S. Patent 2,363,987, issued Nov. 28, 1944.

In a system of electrical exploration, a commutator circuit comprising arc discharge tubes, a source of direct current connected to said circuit, a source of controlled frequency voltage pulses connected to said circuit, grounded current electrodes connected to said circuit, means for discharging said tubes by applying thereto said voltage pulses, whereby the direction of the current flowing between the current electrodes is reversed, an indicating device, grounded potential electrodes connected to the terminals thereof, first relay means actuated by said voltage pulses for reversing the connections between the potential electrodes and the indicating device in synchronism with the reversals of the current flowing between the current electrodes, and second relay means actuated by said voltage pulses to shortcircuit said indicating device during the current reversal periods. - Claims allowed, 3.

8044. Apparatus for Electrical Bore Logging. Gary Muffly, Penn Township, Allegheny County, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U.S. Patent 2,364,159, issued Dec. 5, 1944.

A bore logging apparatus comprising in combination two pairs of current electrodes adapted to be placed in current conductive relation to the earth adjoining a bore, two alternating current generating means one connected to each electrode pair and supplying thereto currents of different frequencies, a pair of pick-up electrodes in current conductive relation to the earth adjoining the bore and at least one of which is adapted for positioning at various levels within the bore, filtering means connected to the pick-up electrodes and tuned to exclude all applied frequencies, and alternating current potential exhibiting means connected to said filtering means, the potentials measured thereby being those created from applied potentials by modulation at the strata interfaces. - Claims allowed, 1.

8045. Seismic Prospecting. W. G. Green, Tulsa, Okla. U.S. Patent 2,364,209, issued Dec. 5, 1944.

A system for conducting geophysical exploration comprising a transmitting station and a receiving station, said transmitting station containing an impulse generating means, said means being adapted to transmit an impulse through two separate channels, an oscillator, a modulator having its input terminals connected to one of said channels and to said oscillator whereby said modulator produces across its output terminals a carrier wave having the frequency of said oscillator and modulated by the impulse derived from said means, a generator of seismic waves connected to the output terminals of said modulator, said generator being imbedded in the ground and adapted to set up variations therein, whereby seismic waves may be sent through the earth, said receiving station comprising a receiving means imbedded in the ground at a convenient distance from said generator and a recording galvanometer, said galvanometer having one pair of its input terminals connected to said receiving means for recording its output and having another pair of its input terminals connected to the other of said channels for recording the instant of initiation of said impulse. - Claims allowed, 4.

8046. Geophysical Exploration. H. H. Pratley, Glendale, Calif.; California Trust Co. executor of said H. H. Pratley, deceased. U.S. Patent 2,364,655, issued Dec. 12, 1944.

The method of locating a body, such as an ore body, or the like in a predetermined region of limited boundaries and of substantially uniform seismic characteristics except for the presence of such bodies, which comprises the steps of generating seismic waves by a single disturbance at a selected generating point on one side of said generating region, receiving said seismic waves at a plurality of spaced reception points on the opposide side of said region, the reception points being so disposed that some of them may be located in the shadow of said body and others may be located outside the shadow of said body, making records of the seismic waves received at each of said reception points on a multiple record sheet, the several records having time and shape characteristics, and determining from said records whether a body is present and the limits of such body. - Claims allowed, 7.

8047. Apparatus for Seismograph Prospecting. O. F. Ritzmann, Aspinwall, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U.S. Patent 2,364,755, issued Dec. 12, 1944.

In a seismograph prospecting apparatus including a series of detector means spaced in the earth at different distances from a source of seismic waves, amplifiers coupled to each of the detector means, the amplifiers having elements which control a characteristic of the amplifier in accordance with the magnitude of energy supplied to the control element, and exhibitor means responsive to the amplified energy transmitted from each detector means: the improvement comprising a control energy channel which diverts a portion of the signal energy from one of said detector means, which is located at a position nearer to the source than other detector means, means for amplifying and rectifying the diverted energy and means for applying the amplified rectified energy to the control element of at least one amplifier which is connected to detector means spaced farther away from the source; said control channel being so constituted as to delay the change in control energy at said element, upon change in signal energy output of said first detector means, for a period of time not greater than the interval between receipt of a given seismic wave at said near detector and receipt thereof at said amplifier connected to said farther detector. - Claims allowed, 7.

8048. Analysis Method for Geochemical Exploration. G. L. Hassler, Berkeley, Calif., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U.S. Patent 2,364,898, issued Dec. 12, 1944.

In a method for analyzing a sample of formation water for the presence therein of extremely small quantities of hydrocarbons, the steps of confining said sample in a closed reservoir partially filled therewith, continuously withdrawing the gaseous phase from the space above the liquid level in said reservoir, passing said gaseous phase through a closed circulatory system while converting the hydrocarbons in said gaseous phase to carbon dioxide by combustion, removing the carbon dioxide from said gaseous phase by passage through an electrolyte capable of reacting therewith to form a carbonate, and determining the amount of the carbon dioxide reacted with said electrolyte by indicating the change in the specific conductivity of said electrolyte, continuously returning the gaseous phase freed from its hydrocarbon content to said reservoir, passing said gaseous phase through the liquid in said reservoir, whereby further hydrocarbons contained in said liquid are caused to pass to said gaseous phase, and continuing the recirculation of said gaseous phase until a complete conversion of said hydrocarbons to carbonates is effected and indicated by the steady value reached by the conductivity of said electrolyte. - Claims allowed, 2.

8049. Electrical Surveying. Norvel Douglas, New Rochelle, N. Y., assignor
to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware.
U.S. Patent 2,364,957, issued Dec. 12, 1944.

Apparatus adapted for geological exploration in bore holes extending from the surface into the earth, including in combination, a drilling tool comprising a drill collar and a drill bit, said collar serving to encase a plurality of oscillators electrically coupled on two terminals,one of said terminals being connected to an exploring electrode insulated from and secured near the end of said tool,and the other terminal being connected to the portion of said tool which extends to the surface, means associated with a first one of said oscillators causing the frequency thereof to vary over a first frequency range when said electrode traverses strata having various impedance characteristics, means associated with a second one of said oscillators causing the frequency of said second oscillator to vary over a second frequency range when said electrode traverses strata having various earth-potential characteristics, and means associated with each oscillator preventing oscillating potentials generated by any of said oscillators impressed across said terminals from influencing the frequency of any of said oscillators. - Claims allowed, 9.

8050. Determining Permeability of Geologic Structures. J. J. Heigl and L. R.
Hodell, Tulsa, Okla., assignors to Standard Oil Development Co., a
corporation of Delaware. U.S. Patent 2,364,975, issued Dec. 12, 1944.

A method for determining the permeability of the various strata penetrated by a borehole comprising the steps of incorporating radioactive material with drilling fluid used in drilling the borehole and subsequently using an electronic method to determine the concentration of the radioactive material along the bore of the hole. - Claims allowed, 6.

8051. Seismic Surveying; O. S. Petty, San Antonio, Tex. U. S. Patents
2,365,289, issued Dec. 19, 1944.

The method of maintaining substantial uniformity of deflection in a galvanometer having an electromagnetic field wherein the energy responsible for deflection is decreasing at a relatively uniform rate comprising, applying said energy and simultaneously energizing said field and providing said field with such self-inductance that its magnetic field builds up at a rate of the same order as the decrease of the deflecting energy. - Claims allowed, 5.

8052. Well Logging Device. B. J. Kalb and D. H. Wise, Houston, Tex.; said Wise assignor to said Kalb. U.S. Patents 2,365,763, issued Dec. 26, 1944.

A device of the class described comprising a container, a conductor cable for supporting and moving the container within a borehole and for conducting electric current between the container and the mouth of the borehole, a source of radioactive emanations within the casing, a shield surrounding said source, said shield having outwardly directed passages to direct radient energy into the formations surrounding the borehole, an ionization chamber within the casing, and quanta measuring means at the mouth of the borehole, said last mentioned means and the ionization chamber being connected to said conductor cable so that the quanta of evergy entering the ionization chamber will be indicated by said means. - Claims allowed, 3.

INDEX

(The figure in parentheses refers to the class in which the entry stands; see list in table of contents).

	Class	Abs.
Alder, R. L.	(4)	7987
Allen, C. W.	(2)	7948
Andreotti, G.	(3)	7962
Ansel, E. A.	(1)	7933
Ballarin, Silvio	(1)	7934
Bath, Markus	(3)	7963
Bays, C. A.	(8)	8011
Bodle, R. R.	(2,3)	7949
----	(3)	7964
Brown, B. W.	(5)	7997
Brown, Hart	(10)	8033
Bruggen, Juan	(3)	7965
Bulanzhe, Iu. D.	(1)	7941
Bulashevich, Iu. P.	(5)	7996
Carder, D. S.	(3)	7966
Cederstrom, D. J.	(8)	8012
Collins, M. P.	(3)	7967
Cram, I. H.	(8)	8013
Cravath, A. M.	(10)	8037
Curtis, L. F.	(5)	7997
Dana, S. W.	(3)	7968
Davids, N.	(2)	7960
Deegan, C. J.	(4)	7988
DeLury, J. S.	(6)	8006
Douglas, Norvel	(10)	8049
Dubiago, A. D.	(1)	7935
Duvall, Wilber	(3)	7978
Eby, J. B.	(1,3)	7936
Erola, V.	(1)	7937
Evrard, Pierre	(2)	7950
Fanselau, G.	(2)	7951
Fearon, R. E.	(10)	8038
Folk, S. H.	(8)	8011
Fritsch, V.	(4)	7989, 7990
Fu, C. Y.	(3)	7969
Gabriel, V. G.	(4)	7991
Gamburtsev, G. A.	(3)	7970

Gemert, A. G. M. von (5) 7998
Gilmore, M. H. (3) 7966
Green, W. G. (10) 8045
Gutenberg, Beno (3) 7971

Haalck, H. (1) 7938
Hammer, Sigmund (1) 7939, 7940
Hartog, H. den (5) 7998
Hasbrock, A. F. (10) 8031
Hassler, G. L. (10) 8037, 8048
Hastings, W. K. (1) 7940
Heck, N. H. (3) 7972
Heigl, J. J. (10) 8050
Heiland, C. A. (8) 8014
Henderson, H. I. (7) 8008
Hirayama, M. (2) 7952
Hodell, L. R. (10) 8050

James, P. H. (10) 8040
Jezewski, M. (5) 7999
Johnson, M. C. (10) 8042
Johnston, H. F. (2) 7953
Jones, P. J. (4) 7992, 7993
Jones, R. H. B. (2) 7954
Jones, W. M. (3) 7973, 7974

Kalashnikov, A. G. (2) 7955
Kalb, B. J. (10) 8052
Keller, F. (3) 7975
Köhler, Reinhard (3) 7976
Kothny, G. L. (8) 8015
Kovrigina, V. I. (1) 7941
Kraskovsky, S. A. (6) 8007

Leet, L. D. (3) 7967
Levings, W. S. (8) 8016
Levorsen, A. I. (8) 8017
Lewis, W. B. (4) 7994

Marsden, E. (5) 8000
Maxwell, C. T. (5) 8001
McGuckin, G. M. (1,3) 7942
Miesowicz, M. (5) 7999
Milatz, J. M. W. (5) 8002
Miller, F. S. (8) 8018
Minton, J. P. (10) 8035
Muffly, Gary (10) 8043
Muller, F. A. (5) 7998
Muzzey, D. S., Jr. (10) 8029, 8044

Nettleton, L. L. .... (1) 7940
Neumann, Frank .... (3) 7977

Obert, Leonard .... (3) 7978
Observatory, London .... (2) 7956
Oil and Gas Journal .... (8) 8019
Ostrovskii, A. E. .... (3) 7979

Petroleum, London .... (8) 8020
Petty, O. S. .... (10) 8030, 8039, 8051
Popescu, I. G. .... (3) 7980
Pratley, H. H. .... (10) 8046

Ribner, H. S. .... (10) 8033
Rich, J. L. .... (8) 8021
Rinehard Oil News Company of Oklahoma .... (9) 8026
Ritzmann, O. F. .... (10) 8032, 8047
Rössiger, M. .... (2) 7957
Rust, W. M., Jr. .... (8) 8022

Salvatori, Henry .... (3) 7981
Savarenskii, E. F. .... (3) 7982
Sawdon, W. A. .... (3) 7983
Schlumberger, Marcel .... (10) 8036
Shimek, E. J. .... (10) 8026
Silverman, Daniel .... (10) 8041
Singewald, J. T., Jr. .... (8) 8023
Skillings' Mining Review .... (2) 7958
Solaini, L. .... (1) 7943
Souther, R. E. .... (7) 8009
Steenland N. C. .... (2,3) 7949
Strautyn, E. F. .... (3) 7984

Tamura M. .... (1) 7944
Taylor, J. H. .... (2) 7959
Tovchigrechko, S. S. .... (1) 7945
Turechek, G. F. .... (10) 8034
Turkisher, R. I. .... (4) 7995

Van Tuyl, F. M., et al. .... (9) 8027
Velden, H. A. v.d. .... (5) 8002
Vening-Meinesz, F. A. .... (1) 7946
Vernadsky, V. I. .... (5) 8003
Vesanen, Eijo .... (3) 7985
Vestine, E. H. .... (2) 7960

Wasserfall, K. F. .... (2) 7961
Watson-Munro, C. .... (5) 8000
Wayne Miller, Robert Du .... (10) 8044
Wickman, F. E. .... (5) 8004

Winter, A. B. .... (5) 8005
Wise, D. H. .... (10) 8052
Wolf, Alfred .... (3) 7986
Woollard, G. P. .... (1) 7947

Yacimientos Petroliferos Fiscales (Argentina) .... (8) 8024

Zanetta, A. J. .... (8) 8025
ZoBell, C. E. .... (7) 8010

CORRECTION: In Geophysical Abstracts 120, p. 10, No. 7811, the expression "les perturbations magnetiques en baie" is more properly translated as "magnetic bays". - V. S.